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MEMORANDUM ON EDUCATION IN MYSORE.

[In this issue we publish some of the opinions we have received on the Memorandum on Education in Mysore. Ed. M. E. J.]

I.

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I trust that it will not be considered presumptuous of me, if I venture to congratulate the Government upon the beneficent proposal contained in their admirable memorandum on Education in Mysore.

I am in general agreement with the Government in many of the proposals formulated in that important document. In a few respects I happen to differ from the proposals of the Government as may be gathered from the subjoined views expressed with due respect and diffidence.

THE PRIMARY SCHOOL COURSE.

(a) This course should be one of 4 years. Anything short of it will not secure permanent literacy and will fail to create the requiste taste for reading and desire for self-improvement.

(b) The instruction should be entirely in the vernacular.

(c) The curriculum should include Nature Study and Elementary Hygiene.

(d) The control and management of primary schools should continue for some years to come, in the hands of the Government, at all events until all the schools are well organized and placed on an efficient basis. The present condition of the generality of the local bodies in Mysore is such as to improbubilize efficient management.

(e) As regards finance, I favour the 3rd altimative, *viz.* the Village fund, Local funds general and Educational cess on Land Revenue and Excise as being sufficiently adequate and elastic.

THE MIDDLE SCHOOL COURSE.

(a) I am of opinion that the course may be restricted to one of 3 years' duration. I do not oppose the period of 4 years at present obtaining. But since the Primary Course is lengthened by one year, I would shorten the Middle School Course by one year so as to enable a pupil of ordinary intelligence and deligence to complete the primary and middle school courses in 7 years. That is, a pupil commencing his or her Alphabet in the 6th year of age will ordinarily have passed the middle

School Examination in the 13th year.

(b) English as a Language should be made a Second Language of study. It may be made compulsory, exceptions however being provided to be granted in the case of pupils desiring to study for Higher Examinations only in the Vernacular. In other words, I would make English a compulsory 2nd Language in the sense that the Government should provide for teaching English in every Middle School whether or not there is a sufficiently large demand.

(c) Elementary Science, Advanced Hygiene and Vocational Training should be included in the curriculum.

(d) All the subjects prescribed excepting English as a Language should be taught in the Vernacular.

(e) At the end of the course there should be a Public Examination.

THE HIGH SCHOOL COURSE.

(a) In view of the present unsatisfactory progress made by pupils during their High School Course, I would strongly recommend that the high school course should be one of 4 years, instead of 3 years' duration as at present. Real and substantial progress can thereby be secured and the pupils who leave off further general study and take to professional courses of study or to professional callings, will be sufficiently well-equipped without being handicapped by inadequate preparation. To obviate any possible hardship in the case of individual students of exceptional abilities, the Head Masters may be given discretion to grant double promotion.

(b) English should be not only an optional second Language but should also be provided as an *optional subject* of study to ensure the acquisition of proficiency in that language enabling the student to proceed to the University.

(c) All the subjects prescribed excepting Mathematics and English as a second Language and as an optional subject should be taught in the Vernacular.

(d) More Advanced Science and Hygiene and Vocational Training should be included in the curriculum.

EDUCATION OF GIRLS ETC.

The curriculum and the courses of study should be the same as for the boys until the completion of the Middle School Course. In the High School Course differentiation may be made by providing a large number of optionals to suit the particular requirements of girls and women.

Mahomedans may be given special schools if so desired and if the demand is sufficiently large.

Backward persons of all communities should receive special encouragement to study in schools. I am opposed to the classification of the subjects of the State into backward and forward communities, for the reasons which I have set out elsewhere. Large numbers of backward persons are unfortunately to be found in every community even in the so-called "forward" communities who stand in urgent need of help and encouragement. They ought not to be ignored and left to shift for themselves merely because they happen to be born in certain communities, a few members of which have been so fortunate as to receive higher

education and to occupy prominent positions in the Public Service.

DEPRESSED CLASSES.

I would respectfully urge with all the vehemence at my command that the country is not yet ripe for the co-instruction of these classes along with the other classes of people in the State, more especially in the primary and middle school stages of instruction. The depressed classes should certainly be enabled by all reasonable and prudent means to rise socially and intellectually. For this purpose at the present time and for some years to come it is advisable to give them special schools and special and generous encouragement. Special Hostels should be provided for them in which they will be taught and habituated to lead a pure and cleanly life in matters relating to food, clothing, bathing etc. so as to become less objectionable, if not altogether unobjectionable, to pupils belonging to other communities.

TRAINING OF TEACHERS.

One Training College for the whole state with a sufficient number of suitably located Training Schools affiliated to the training college is a prime necessity.

RELIGIOUS INSTRUCTION.

I am in full agreement with the proposal of the Government that earnest and continuous effort should be made to impart direct non-sectarian religious and moral instruction to the pupils in all stages of education.

PUBLIC EXAMINATIONS.

One examination at the end of the Primary School Course, one at the end of the Middle school Course and one at the end of the High School Course are necessary.

AIDED SCHOOLS.

In my humble opinion, efforts should be made to encourage the starting and maintenance on an efficient basis of denominational schools to meet the requirements of the people in their present state of social and intellectual development. Grants on a reasonably liberal scale should be granted to such institutions. I deprecate compulsion in regard to the admission into such schools of pupils belonging to communities considered objectionable by the managers of such schools.

FREE EDUCATION.

I am entirely in favour of making education free in all grades. The question of expense disappears if the money spent on public education is considered (as it ought to be) as an Investment. The case for free education in Mysore is all the stronger for the admitted reason that the return to the Government in the shape of school fees is quite negligible.

AGE OF COMPULSORY EDUCATION.

It will soon become advisable, if it is not already so, to fix the compulsory period of education from 7 to 14 years of age. The present limit of 7 to 11 will not secure any permanent literacy to children and will not prevent relapse into illiteracy.

II.

REV. W. PERSTON,

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Every public spirited person will congratulate Government on the issue of this Memorandum. It represents a courageous attempt not only to envisage the educational needs of the state, as a whole, but also to devise a policy to meet those needs worthily and that soon. Informed educational opinion and experience alike give their sanction to the principles which guide the proposals of the Memorandum. These I conceive to be two:—

(1) Schools ought to be of one type and this ought to be such as provides parallel instruction in Vernacular and English.

(2) Such schools ought to be established in such numbers as to bring the educational ladder to the feet of the village boy.

The latter principle needs no commendation.

Nor does the former need any commendation which it cannot obtain. If a chance of higher education is to be presented to every child, since acquaintance with the English Language is the *sine quanon* of advanced education in present circumstances, facilities for making such acquaintance early ought to be at hand for every child. This is the educational justification of parallel education Vernacular and English. As to the one type of school; democratic opinion in England, Germany and other western countries after experience of schools differentiated as Scondary and Elementary emphatically declares for one type of school and that made accessible to all.

Recognising and altogether approving the principles of the memorandum I should like to make two remarks on the procedure it suggests.

Directly, then, with respect to the abolition of the Kanarese Lower Secondary certificate, a negative effect of the new proposals. This it seems to me, might be reconsidered, not in a way which would reinstate a purely vernacular educational arrangement but to provide a certificate of a certain standard of vernacular education for pupils who are not successful in mastering English. In this connection I suggest this following considerations:—

(a) As the memorandum itself suggests by on the one hand, excepting English in the case of students who are proceeding to Higher Oriental Studies and those not proceeding to High Schools, and on the other, by approving Kanarese as a general medium of instruction, an education of some value is possible in Kanarese. This ought to be true of the new type of school to an extent in which it has never been true in many purely vernacular schools.

(b) Experience suggests that a considerable proportion of vernacular school pupils have little language faculty and that all the faculties of some others develope late. Both sorts may reach a respectable standard of vernacular education.

(c) The Elementary teaching profession has been largely recruited from men of the standard of education represented by the Kanarese Lower Secondary. Taught in better equipped schools and more adequately trained, such men ought to continue to make respectable teachers.

(d) A certificate of educational status has a market value in India and this value ought not to be destroyed unless a greater compensating gain for the same class of people or for the community as a whole, is in view with respect to the large question of the almost immediate provision of a large number of new schools and the consequent emergency training of a large number of new teachers. It seems to me that in face of the recent failure of a scheme to increase the gross number of schools in the State quickly and in view of the fact that the adequate preparation of the teacher is the only sure guarantee of permanence and effectiveness in the new educational work now to be attempted, an endeavour to combine with pace in the provision of new schools adequate training of teachers would ensure the best result.

III.

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THE GRANT-IN-AID SYSTEM.

The grant-in-aid system which was inaugurated in the year 1914 has no doubt ended in a failure and a wasteful expenditure of public funds. It is also true that this scheme has stimulated a demand for schools in rural areas, the direct consequence of which is that a number of ill-managed schools have sprung up which now require consolidation. All rural schools must be schools over which the Government will have full control. At present the schools under the grant-in-aid system are left without any inspection. In many of the schools the teachers are only getting the Government grant although their schools contain not a single boy.

These schools have suffered greatly because proper teachers are not available to do the work under doubtful conditions. The villagers who, in their enthusiasm to have a school in their village, promise and pay their contribution for the first year, slowly slip back and not only fail to pay but sometimes refuse to pay. It would be harsh if the villagers are compelled to pay. Thus it is necessary that all rural schools will hereafter be Government schools managed mainly by Government agency, in which case efficiency and permanency will have been guaranteed. The voluntary help rendered by the villagers must be kept in reserve for giving prizes to the intelligent boys.

Side by side with the increase of these rural schools, the inspectorate must be increased also. About 30 schools should be placed in charge of an Inspector who must be visiting a school once in a month. He must not only visit the school but also take part in teaching work so that the teachers may learn the art of teaching.

The proposal of the Government to provide for 10,000 primary schools is no doubt not a very ambitions scheme, considering the importance of educating the masses.

The question of affording trained teachers isno doubt a grave problem, but this problem can easily be solved by trying to find out the natives of the villages where the schools are situated to do the teaching work. It is impossible to begin with, to ensure ideal conditions. As far as possible the intelligensia of the village should be trained and utilised. With the adoption of this principle in selecting teachers, the problem of supplying teachers to these primary schools must be an easy task.

It must be the solemn duty of the Government that no school shall be stated until the full equipment is guaranteed. Just now the condition of 75 per cent of the present number of school is very miserable in this matter.

Again all these schools should be made to admit girls also, as in villages girls' education is more necessary that that of boys. Hence education for both girls and boys must be made compulsory. This becomes easy if the boys' schools are opened out for girls also.

The hours during which the classes are to be held in villages, must be slightly altered in the Malnad and Maidan parts so as to suit the agricultural conditions. It must never be the object of education to divert a man from one accupation to another. The fate of many industrial countries has been that they have to depend for their food-stuffs upon foreign countries. This mistake of converting an agricultural population into a quill driving population must be avoided, by affording facilities to those who study in these schools to join their parents in doing agricultural work. Education should strengthen the back bone of the country rather than break it. It is not only the class hours that should be so adjusted but also the vacations and other holidays. This would secure better attendance of boys to schools during a portion of the year, when the people are not busy with agricultural work.

IV.

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SPECIAL FEATURES.

i. A truly democratic programme.

ii. Evinces that the Government is really and keenly alive to the needs and wants of the people as a whole—at least a desire to be so alive.

iii. Shows the true spirit of a statesman in as much as it calls for public opinion on the views thereon which purport to effect an overhauling of the present system.

A SPECIAL REQUEST.

i. It is earnestly hoped that the Government will seriously take into consideration public opinion and modify their proposals accordingly.

ii. This so-called democratic programme is also radical in its nature. Much of it seems to be based upon the note of the I. G. of Education. Our present I. G. has made a special study of the University Education, at least his deputation was meant for that purpose. *Would it not be more* reasonable and more fruitful, to take the opinion of a committee of expert Educationalists-official and non-official and surely there are other Educationalists in the State, though they have not been to foreign countries—instead of calling for public opinion in this hap-hazard way which rarely expresses itself? We have eminent Educationists in the professorial staff; and being in Government service, they may not express their opinions and views on this all-important subject unless they are asked to do so. A special committee of Educationists, Retired I. G's some Professors and some non-Officials who are taking interest in Educational matters might be appointed to consider this Memorandum and express their opinion on the changes mentioned therein.

Coming to Primary Education.—Compulsory Education and system have been much criticised and ingenious and of course forcible arguments are brought in to show that compulsion works hardship, is an anamoly, is inequitable and grossly unfair to the villages. These forcible and eloquent arguments would lose much of their value, and objections against the compulsory system would be considerably reduced if the question is considered from the proper point of view. The vehemence and eloquence with which compulsory education is denounced as being impracticable and unjust to the villagers, the idea of ideal equality and proportional burden and benefits seem to come from one who is either a rank socialist or a keen worshipper of party faction and communal feelings, or a Utopian philosopher ignorant of the actual world and administraton.

The financial objection that the villagers are made to pay for compulsory education, whereas the townspeople are enjoying the benefits gratis and unasked for, seems to be more imaginary than real. If the villagers pay directly for raising a school building under the compulsory scheme the towns people pay indirectly a more than proportionate amount for primary education in the form of Municipal taxes in the cities; and the Municipalities meet a major portion of the expenses of Primary Education in the cities compared to departmental contributions. The financial objection being thus answered, it remains to see whether other objections are

imaginary ones or not and whether they are really insuperable. The compulsory system as introduced in particular areas is charged with unequal and inviduous treatment of cities, by establishing schools where there already exist some, and not establishing them where there is real need. This objection too is only superficial in as much as it overlooks the real significance of need. We do not doubt that there is need or that there ought to be need for Primary Schools in villages from the point of view of progress. We all know and the Department ought to know how eager or otherwise the rural population is towards compulsion. It would be unmeaning to say that they clamour for new schools, when most of them have to be compelled against their will to send their boys and girls to schools. The fact is not that there are no schools in village parts where people really clamour for it, but that there are not enough schools from the compulsory system point of view and in those rural areas which are brought under compulsion scheme, difficulty is experienced of non-attendance and irregular attendance with the unpleasant consequence of imposing penalties on parent defaulters.

The principle of compulsion is obvious enough. Compulsion must be introduced slowly, gradually and by choosing the line of least resistance. Experience has shown that rural parts are not only reluctant but even opposed to sending their boys to school. And urban parts are only too glad to have an opportunity to educate their boys. Hence compulsion is first introduced in the urban parts and is introduced in the village parts on conditions that would secure its continuancy. It is only sensible and reasonable to introduce the scheme in those parts which can really appreciate and respond. But it would be mere child's play to introduce the scheme where there is no heart's response.

The urban population on the average is poor, relatively poor, and with all the temptations and difficulties of city life, if the people of the urban parts are not given every facility to learn at least the three R's. These uneducated people in the towns, having nothing to do, not even the agricultural occupations, would turn out to be a serious menace and danger to society. Hence it is not merely fruitful, but even expedient and necessary to introduce compulsion in the urban parts first, and then gradually in the rural parts. To regard this a great social injustice, is to lose sight of the very fundamental principles of the compulsory scheme, and perhaps to delight in Rousseau's quibbles of natural justice and perfect equality. A town is a *town*, a village is a *village*. It would be neither desirable nor possible to have all towns and no villages. Hence to denounce the compulsory scheme on the ground of imaginary injustice and inequality it works, does not stand very much to reason and common-sense. We all aim at progress and by no means do we advocate a retrograde step. If compulsion is not quite possible at present in all the villages, that is no reason why it should not be introduced wherever possible and feasible. In the name of progress and civilisation, let us try our best to encourage and spread compulsory education in as many parts as possible and in all parts in the near future.

One other objection against the compulsory scheme needs some answer-and that is, that in those parts where it is introduced it is not working properly. This seems to be, not a defect in the system, but a glaring admission of departmental incapacity to successfully cope with the situation and apply the scheme rigorously and tactfully. If earnest and enthusiastic men that can command respect and inspire confidence and can evince tact are chosen for the arduous task of introducing and superintending the scheme, such a difficulty need not arise at all.

Even primary schools must impart free education. The anamoly pointed out by the

I. G. of some of the Primary schools levying fees for teaching English in the II standard must be removed by making the primary course a purely vernacular one, and not teaching English in that standard.

It is very essential both on principle and practice that all primary schools must be managed by the Local bodies, assisted by the department in the matter of Inspection, Curricula and the prescribing of Text-Books.

The curriculam must undergo thorough change. Arithmetic—the first four rules, and calculations based on Rs. A. P. must be taught by the end of the Primary course. History of Mysore and Geography of the same in Kannada must be mastered.

A student by the time he finishes the Primary course, must be enable to read and write fairly Kannada printed books. *Padyasangraha* and *Neethisangraha* and popular simple poems must be taught. It is most deplorable that boys of this standard seem to betray an awful ignorance of Indian legend and folklore, which ought to find a place in any national system of Education. Daily or once in two days, lectures in Kannada on the Indian folklore, and epics and legend ought to be delivered to the classes in simple homely language so as to rouse the imagination of the young student who ought to evince real interest in the national stories and begin to take pride in the same. This system of lectures on the folklore and Indian epics and stories would alone rouse interest in the young minds and appeal to their imagination. Side by side with this system of moral lectures and story—telling, a regular lesson in *Amara* "that immortal Poetical Dictionary," ought to be given ,as that alone would train the memory. If the primary education does not aim at training tbe young minds on national lines, does not arouse in the students real pride and love for the Indian heroes, if it does not *train the memory* at a time when it could be best trained, and if it does not teach the boy enough to read and write Kannada and calculate fairly well the daily transactions, then such an education, given at so much expense would be a pitiable waste of so much time, money and opportunities. It behoves the Government and the Department to insist upon the Primary Education, being a real education not simply a farce and waste of four years. We have known instances of boys of the I and II standard not knowing half as much as boys of the old pial schools however unsatisfactory the latter might be in their working. Drill and Drawing and some visual instruction must make the primary Education a real and *efficient* one. Frequent inspections by efficient Inspectors who should see how and what the masters teach and what progress they make every month, would certainly improve the teaching especially if trained masters only are appointed.

One other suggestion, calculated to make primary education efficient and effective is the raising of the minimum pay of school master to at least Rs. 15. The present minimum deters many a a young man from seeking service in this Department. Service in other departments is generally more attractive. Hence the initial pay must be something that would enable the masters to keep the body and soul alive.

Coming to Middle School Education:—This is the most important link between the Primary Education and the Higher education and as such it must be conducted on almost ideal lines. Physical mental and moral aspects of education must be properly emphasised in this course. Now that the middle school education has been made free, this ought to correspond to the liberal education so highly spoken of in the West. The curriculam must be comprehensive enough to provide proper choice to the urban and rural population according to their several aptitudes and opportunities.

The abolition of separate Kanarese Lower Secondary Examination would do irreparable injury to the cause of the vernacular of

the country, nay, would deal the death blow to the mother tongue. This suggestion from one who was a staunch Advocate of Vernacular University for the State, is ridiculously inconsistent and inexplicably mysterious. This modification of the Middle School course would work untold evil and is fraught with grave national danger. As Mr. Rees a foreigner has rightly pointed out, we shall be doing immense injustice to our mother tongue, instead of giving it the foremost place. Though you artificially make Vernacular the first language and English the compulsory second language, the latter will become the foremost and all important language engrossing the attention and interst of the student and engaging the serious attention of the masters and perhaps even of the Departmental authorities. Failure in Kannada in Lower Secondary Examination is even now exonerated and never regarded as a disqualification or a disgrace. In fact, those that fail in Kannada are put on the same level as those that pass in it, so far as promotion to the next class is concerned. Attendance and attentiveness in the Kannada classes are proverbially poor and the interest that English-knowing boys take in Kannada lessons is something not worth mentioning. The Kannada periods are regarded as a breathing space even by the earnest students of English schools. (Whereas failure in English is an absolute disqualification—an irreparable disability for promotion. When such is the importance attached to the English language, how could students be expected to devote serious attention to an obviously unimportant subject?) This is the inevitable fate of Kannada so long as it is placed side by side with English. This defect is not due to the language itself. For students in the Kannada Lower Secondary classes and Upper Secondary classes study the mother tongue as seriously as if they seek salvation through it. Whereas those that are privileged to study English go with a determined prejudice that Kannada texts are easy and a study of the books could be made up just on the eve of the examination. Hence it would be quite desirable to put off this period of comparative indifference to the mother tongue as long as it is possible, and to provide a course of study in which the main attention and interest would be rivetted upon the vernacular. Making English compulsory along with the Vernacular would deal a double blow to the language, and to the *morale* of the student population. We could be unconsciously and innocently encouraging the unjustifiable contempt and disregard for the Vernacular and that at a very early and impressionable period of a boy's life, if we should ask the boy to study both English and Kannada as compulsory languages. We would be indirectly responsible for the growth of unnational instinct in boys. It is very curiously suggested that the spread and growth of the language will not be hampered by this system and that the progress of the vernacular may be safely relegated to the tender mercies and good sense of a few of the educated men who may perhaps take a spasmodic interest in the growth of the Vernacular. We might assure the proposer as well as the public that what we want is the spread of the vernacular as a popular and living language as much as a literary language. And this can rarely happen if you stifle the love for the Vernacular even in your scholastic course and relegate to a secondary importance.

The effect of this proposed policy on the village and rural population is obvious enough. As Mr. Rees has said, as soon as a boy begins to know a smattering of English, his ideal would be to look with undue contempt upon the villagers and village life. We have launched upon a grand policy of spreading education and dispelling ignorance but not of destroying everything that is noble and useful of village life. Villages and villagers are as much necessary as cities and perhaps even more so. We can

have no justification in endangering the growth of sturdy village life and rural industries by giving effect to our dreamy and airy notions of equality. The criterion determining the policy must be—not what the irresponsible people want but what is best and necessary from the point of view of higher interests of the State. The educational policy must aim not so much at unification as at the greatest good of the greatest number.

There seems to be something fundamentally wrong in the educational policy which proposes this abolition of the Kannada Lower Secondary Examination and unifying the middle school course, by making both the languages diametrically opposed to each other in every respect, compulsory. Knowledge of English is not necessary for our ordinary village and even urban life and transactions and industries; on the other hand, it would be a decided obstacle for the healthy growth of village life. What is wanted is some education that would enable people in general to come out of rank ignorance and to understand the world. It would be a serious blot and a monstrous libel on the vernacular to say that it cannot serve the purpose of general education. We must not encourage our people in general, and villagers in particular, to think and act and speak in terms of English and English standards. English ought to be the medium of higher instruction and as such its knowledge would be essential only for those that devote themselves to Higher and University Education. But let not the mania of Higher Education overpower the people in general, and make them fritter away their energies in an undesirable and futile attempt to go to higher literary education. If you make English *compulsory* at an early stage, no one will think of our necessary rural industries, no one will think of taking to agriculture, no one will think of living in the villages, and every one will think either of becoming a quill driver or of entering upon higher literary education, a task admittedly beyond the reach of every one.

The physiological and psychological effects (evil effects of a study of two unconnected languages at an early stage) have been ably, effectively and earnestly reiterated by all acknowledged authorities on education both in the West and in the East. But here, in this Model State, we find an abortive and unnational attempt of forcing every one, who advances beyond the primary stage, to learn both languages. Much of this policy seems to be the outcome of a slavish attempt to copy the English system originated by those who profess to have first hand knowledge of that system without understanding the fundamental differences in the temperament and character and needs of two people. Even Mr. Fisher, the greatest authority on the *English system of Education* and certainly not an authority on the needs and wants of the Education in India—has not forced upon the people a study of two unconnected and opposite languages neither of them a classical—one compulsory.

The unification of types in the Middle School course is a very charming and attractive dream to the unthinking mind and rousng as it does the imagination of only the masses, it does more good to the heart than to the head of the originators and admirers and apologists of the scheme. At the best, it is perhaps a well-meant, but most certainly an ill-judged scheme. Physiologically or psychologically, from the point of view of the spread of the Language and of the growth of a healthy national and rural life and spirit, it is most unsuited and positively mischievous. The only thing commendable about it is, the appeal to the heart and imagination of the people in general. If the paternal and benevolent Government of His Highness the Maharajah is actuated solely by national spirit, if it considers the interest and good of the nation more important than the clamour of a few people, if it wants to bestow proper regard to the growth and

spread of the Vernacular, if it does not want to deplete the village and destroy the useful village life and rural occupations, if it does not want the manufacture of men unfit for anything else except clerical and Government service, it behoves the Government to think twice before introducing this scheme *of making dual languages compulsory and* abolishing the longstanding and really useful Kannada Lower Secondary Examination.

One other inevitable consequence of the proposed scheme would be the lowering of the English Lower Secondary standard by attempting to adjust the Examination to the needs of the thousands that blindly seek it, whereas High School experience—which neither our I. G. of Education nor our Secretariat officers profess to have—shows how difficult it is to make the large number of the IV form standard students follow the instructions given therein. Another very serious consequence, unfortunately lost sight of, by the Educational Department which has proposed this scheme, would be the difficulty of obtaining suitable teachers for the 10,000 Primary and purely Vernacular schools. An English Lower Secondary passed candidate who has plodded on for a few months the High School course is just the most unfit person to undertake the really arduous task of teaching the villagers. His little knowledge of English is really dangerous to the village life, besides being superfluous. It is admitted on all hands that the most discontented man is the one, who has made some progress in English Education. The poor salary offered in the village schools combined with an unhealthy spirit of discontent in the teacher, would make teaching in the primary schools most inefficient and ineffective.

We may be accused of offering all the while only destructive criticism without offering any constructive suggestions. We have suggested already that the primary course—a purely vernacular one—should be of four years. We insist upon retaining a dual type in the middle school course and not sacrificing everything for the high sounding name of unification. The Vernacular Lower Secondary Examination course must be one of three years. Suitable provision must be made in this course for the provision of subjects consistently with the usefulness for and aptitudes of, the rural and urban population, by making agriculture or one or two of the rural occupations optionals in the rural schools, and some industry and drawing optional in the urban schools. To provide an opportunity for students to go to English Education, English must be taught in this three years Vernacular course; but this must not become an examination subject. It must be only a subsidiary subject taught just to enable those that care to take to *literary education, but by no means a prominent* or compulsory subject. Those that pass this Kannada Lower Secondary Examination may be allowed to appear for the English Lower Secondary Examination, after one year's course and tuition of English subject only. The English Lower Secondary course must be one of four years, one year longer because it involves the study of an additional difficult subject.

Subjects for these two examinations would stand thus :

Kannada Lower Secondary Examination
(3 years.)

Compulsory:—Kannada language or Hindustani.
Mathematics.
Indian History and Geography and any two optionals.

English Lower Secondary Examination
(4 years course.)

Compulsory:—
1. English language.
2. Kannada language.
3. Elementary Mathematics.
4. Indian History and Geography and any two optionals.

Hygiene, Agriculture or one of the rural occupations; (c) Industry such as carpentry, painting, basket-making etc.; (d) Sanskrit or Persian or Kannada in the case of Urdu students; (e) Mensuration; (f) English or Drawing and Drill and Moral Lessons being non-examination subjects.

Medium of instruction should be entirely Kannada and boys should answer the subject in the vernacular except in the subjects 1 and 3 of the English Lower Secondary Examination. Kannada Lower Secondary students in the English Lower Secondary must be given special coaching in English, instead of the other subjects in which they have passed. This scheme has all the advantages of the reformed scheme and none of its disadvantages. *It only lacks the name* of unification of type, but it is by no means revolutionary.

Coming to the High School course, we quite appreciate and endorse the views and suggestions of our enthusiastic I. G. of Education, especially his Polytechnic course which is calculated to make the students real practical men well equipped to enter life and earn a living. The twofold ideal of High School education, to fit a man to earn a living and perhaps to take to higher education: is well worth attaining, and whatever tends to attain this ideal is really welcome. The humanistic and practical and at the same time the literary aspect of Education must be well emphasised in the High School course. English must continue to be the medium of instruction till our vernacular literature grows and is well abreast of modern ideas and modern science. Western knowledge and western literature and science is indispensable in any system of sound education, and till we can have books in abundance in the vernacular on these subjects, to think of making the vernacular the medium of instruction would be simply losing sight of the real aim of education in our eager desire for reform. Though English should continue to be the medium of instruction, every incentive should be offered and every effort encouraged to spread the vernacular literature.

The School Final system seems to have a tendency to make the students as well as teachers more and more mechanical, to bring into prominence the dull average instead of emphasising the importance of superior intellect and mental faculties. "Some education for all and the best education for the few" must be the key stone of all educational policy and this must be well emphasised in the *High School course. The system* of weekly lists should be well nigh abolished, the system of giving notes and cramming up undigested matter must be strictly prohibited, and arrangements should be made to introduce an efficient system of lively discourse and conversation followed by short lectures on the subjects concerned, and special attention should be paid to make the teaching and the lessons systematic. Students of late seem to think that the teacher will do everything for them and will prepare the lessons and give them ready made pills to swallow up while, they, most of them go to the classes with a vacant mind absolutely unprepared to receive instructions in the class. Particular emphasis must be laid on the students as well as teachers going prepared to the classes, and every student must be made to write a synopsis of what has been taught in the class. The conversational part of the teaching is meant to test how far the students have understood the previous days lessons and how far they are prepared to receive the new lessons. Divided responsibility in any subject is a most pernicious and inefficient system, and as far as possible only one teacher must be held responsible for one subject in any class.

The principle of making Indian History and Geography compulsory non-examination subjects is a mockery and thousands of students there are that profess to have passed out the examination without knowing the elements of these subjects. These must be

made really compulsory subjects and students must be examined in these subjects in the public examination. At present, there is no systematic study, no systematic instruction and no systematic course so far as these subjects are concerned and it is to be hoped that the department will give a proper place to these subjects in the curricula so as to attract the proper attention of the students and teachers.

The system of non-detailed text-books and their study in the IV and V forms seems to be doing no good to the students. The books selected are shabby and the information contained therein meagre and they form at times murdered and mutilated abridgment. The outlook of students is necessarily narrowed inasmuch as they never even glance at the non text-books and the study of general books receives absolutely no proper attention and importance.

How far the introduction of Pedagogue's as an optional has borne fruit one fails to see. To expect a fellow to specialise in teaching and that only theoretical teaching, when he has not had the necessary amount of general education as is offered by the High School course is a wild dream. Teaching is of course technical but not so technical as to be managed without at least the minimum amount of general culture. Even Mr. Fisher, the great authority on Education in Britain, seems to have recaptured the futility and unwisdom of introducing this subject at such an early stage. Let a man come out of the school final course, equipped with the minimum amount of general knowledge, and then if he cares to take to teaching, insist upon his undergoing training and acquiring proficiency in theoretical as well as practical teaching.

Special merit and high order of intellect and superior mental faculties should ever receive a premium and special encouragement and indusement should be offered in recognition of merit. The system of awarding prizes was intended chiefly to reward special merit. That system should be continued in no halting manner. If we encourage men of merit and superior talents we shall be increasing the national asset of the country. Thus while it is fair to create equality of opportunities to one and all to advance in education, we shall be doing a great national injustice should we fail to recognise and reward special merit quite uninfluenced by any other cousideration. The only motive of the Government in rewarding superior intellect should be the eager desire to add to the invisible national wealth.

A word more about the school final system. The principle of moderation of marks and the basis of the dead average works hardship upon the really intelligent students. The examination must try to ascertain the absolute merit of a student and those that obtain the passing minimum must be declared to have passed irrespective of their performance in the class. The class marks should come to the rescue of a student who by chance may not obtain the passing minimum. There have been instances in which the principle of moderation has worked great mischief in undoing those that perform well in the Public Examination. It is hoped that such an anomoly will not be permitted to reapeal itself.

The dissociation of practice from theory is nowhere so conspicuous as in the declaration in the Memorandum that the Hostel system should be encouraged and the recent orders of the I. G. of Education withholding grants to some of the recognised Government hostels. The principle on which the Government hostels attached to the High Schools in the State are abolished does not appeal to common sense. By all means private effort may be encouraged; but why the recognised hostels that were the refuge and not the place of charity for the many seekers after knowledge in out of the way places should be discontinued is beyond comprehension. In these days when special importance is attached to all round education,

mental, moral and physical, when the development of a sound body is regarded as much necessary as of a sound mind and of a sound soul, to abandon students who are exiled from the wholesome influence of a home to the whimsical mercies and mercenary care of private hotel-keepers would contribute to the physical degeneration, utter neglect and ill health of the rising generation of students. When residential system of education and Boarding Schools are the order of the day, when the modern education pretends to develop the character of the student quite as much as his mental faculties, when the teaching authorities are expected to mix as far as possible with the students and watch their movements, what possible justification or plausible argument can there be brought forward to exonerate the step the department has taken. The public sincerely trust that the Government will act up to the situation and revive the hostel system.

That the training college should be better equipped and better staffed, and be brought under the fostering care of the University is an absolute necessity. All our educational programme would be an idle waste and mockery if we don't bring in better trained and equipped men to the work. The people that undergo graduate training in the present institution carry no status with them in the estimation of the public. If it is made a University Examination, if training is left to the hands of able professors, and if the institution is better organized and controlled, it is bound to attract many more young men. Every graduate teacher must be made to undergo the improved training, and raw recruits should no longer be appointed to educational service before they have undergone training. Even those that have had training and are in service must be required to revisit the ideal institution partly to brush up their long forgotten or long acquired knowledge, partly to make themselves more up-to-date and methodical, but chiefly to give the benefit of their experience and offer suggestions regarding the method and organization o teaching. The training college must be a central laboratory for experiments in the system of education. The lack of a Teachers' Guild in this model State speaks volumes about the kind of men recruited to the Department, the kind of encouragemen and treatment the Department gives and the spirit with which teachers take to work. While we are thankful to the band of self sacrificing teachers and while we mean no desparagement to the existing tutorial staff, we must point out that the Department is not attracting first-rate men, and that it has come more or less of a refuge to people that are disappointed elsewhere, and that the department has not done due justice to really capable and earnest teachers who perforce give up the sacred profession.

There is so much talk of the Civil Service re-organization, Police and Excise service re-organization, but not of re-organization of Education service. If this department can't offer as good prospects as other departments, how can we be sure of attracting able men. The proposed alteration of salaries and grades is not at all satisfactory. The old 200-20-300 Rs. grade must be continued and special places in Rs. 350 and Rs. 400 grade must be reserved for the Head-master's places in the Collegiate High Schools. The Assistant master's grades in the High Schools and those of the Assistant Inspectors must correspond to the grades in the secretariat, *viz.*, 50-5-100 and 125-10-175.

The needless and frequent change of text-books by the Department is a positive nuisance and must be scrupulously avoided. Many of the books prescribed are not fit even for a light study in 'the summer share' or by the 'winter fire-side.' Most of these books contain "baby talk" and "booby information." Why the unfortunate parents of school-going students should be penalised for the ignorance or indifference of the prescribing authorities is hard to understand. Experience and up-to-date methods would

rhaps necessitate a change in the system teaching but not necessarily of text-ooks.

From the Education Review it is clear at out of the 257,601 students in primary hools only about 800 or 3 per cent reach e Collegiate class and the output of gradues calculated from these is only ·01. This roves the necessity for educational organiation to absorb boys who discontinue educaon at a certain stage either in service or in chnical branches. It is also very desirable at an able educationist should be sent to ondon County Council to study the system f Educational Administration in all aspects.

In conclusion, recent experience of educaional administration brings out prominently n awful confusion of principles, an unjustifible overlapping of the spheres of the execuive and initiating authorities, an utter disegard of public opinion, and an over centraliation to an undesirable extent. The Government, through the educational secretariat nust lay down the policy and the Departnent must strictly carry out without any omments of its own, and also supervise and naintain efficiency, and organization and o-ordination of the various educational instiutions. It is no good that the Government should simply re-echo the suggestions of the Department. It ought to reserve the initiative entirely to itself. For this purpose an experienced educationist who was himself a teacher and who has had personal experience of teaching must be selected to be the Education Secretary. And an Educational Board fairly representing public opinion and expert opinion ought to be constituted to lay down the policy and to correct and check the possible vagaries of the executive. Then only can we work out a really democratic programme of educational policy in a really democratic and not autocratic spirit.

V

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PRIMARY EDUCATION.

The defects of the existing schools and of the compulsory system of Education are not, after all, so great as one might be led to imagine them to be from the severity of the criticism to which they are subjected. It must be admitted, however, that ideal perfection has not been aimed at in the organization and distribution of schools, nor has ideal justice been the aim in the working of the Compulsory Education scheme. The existing school represents the results of attempts made from time to time to adopt the existing type of school to the growing requirements of the locality. It is the existing Upper Primary School that is now recommended for adoption as the new single type school. Minor alterations were permitted to be made in the original type, when such appeared to be necessary. Thus one or two higher classes were added where the growth of a school justified such addition. Where there was a demand for English education, English classes were opened, the villagers paying in advance a year's contribution which they recovered from fee collections. When a new school had to be opened, as in the case of thousands of grant-in-aid schools of 1914, it was permitted to begin with only one class, the lowest, as nothing else could be done in a village which had a school for the first time. When the Practical Instruction Scheme was introduced, classes for practical instruction were opened in a few selected schools. When each of these changes was introduced, the limited resources at the disposal of the Department made it impossible for it to make any attempt to adopt the new arrangement at once in all the existing primary schools.

It is proposed to maintain in future ten thousand Primary schools of one type with four classes. An intelligent boy entering school at the age of five—the age at which Indian boys are generally sent to school—can complete the four years' course by the time he is nine. This aspect of the question has to be considered in connection with the scheme of compulsory education. It is perhaps advisable to restrict admission to those who have completed their sixth year. It is also a point for consideration whether among more than nine thousand villages which are to have only a Primary school, a few hundreds at least will not, in course of time if not now, aspire to have reasonable facilities for the higher education of boys in their own villages. In cases of real need, the Department should be prepared to open secondary classes with optional English or Industrial courses.

THE GRANT-IN-AID SYSTEM OF 1914.

This also has come in for some severe criticism. It was the slow progress that primary education had made in the past and the difficulty of finding all the funds required to give it the impetus which it very much needed, that suggested the bold experiment of giving the rural population an opportunity of indicating how far they were willing to co-operate with the Government in their desire to bring about a rapid extension of elementary education in the State. It was believed, not without reason, that the villagers prefered paying a portion of the cost of educating their children, to waiting until schools could be started in their villages at the entire cost of Government. The results achieved have surpassed the most sanguine expectations. Thousands of schools have been started. All promising schools have to be retained and their wants supplied.

COMPULSORY EDUCATION.

Much stress has been laid on the injustice caused to the rural population by the introduction of the compulsory system of education in towns and cities in preference to rural areas. A beginning had to be made with towns for more reasons than one. It was easier and far less expensive to introduce the principle of compulsion in a town than in a rural area. The additional number of children for whom provision was required was much smaller in a town than in a rural area. Buildings and School Committees of persons capable of dealing cautiously with new conditions, could be secured more easily in towns than in rural areas. Children who would have to attend under the new regulation in towns, were mostly children of artisans, labourers and mendicants who live almost exclusively in towns and who till now have made scarcely any attempt to educate their children. It will hardly be disputed that when any new arrangement of a complex character is to be introduced it is best to introduce it in localities where there is the greatest chance of its being worked successfully.

If the limit of compulsory age is to be raised, apart from the difficulty of providing for a large increase in expenditure, a difficulty greatly increased by the abolition of fees in middle schools—the difficulty of finding adequate accommodation and staff would have to be considered. It would be best, therefore, to defer the consideration of this question to a later date.

SECONDARY EDUCATION.

For Secondary Education it is proposed to have six hundred schools all of one type in which English is to be taught as a compulsory second language. More than one hundred of the existing middle schools are for girls and they had in them in 1916-17, one thousand and fifty girls in classes fourth and fifth, giving an average of ten girls to a school. Several of the schools could not have more than half a dozen pupils in classes fourth and fifth. Whether it is not a very difficult task to maintain a school for half a dozen elderly girls, some of the schools being Hindustani schools, when an adequate number of women teachers capable of teaching

English cannot be secured for them, is a matter which requires careful consideration. For the conversion of two hundred vernacular middle schools into Anglo-Vernacular middle schools, four hundred teachers capable of teaching English up to the Lower Secondary Examination standard are required. How teachers with satisfactory qualifications can be found for these when in the existing two hundred Anglo-Vernacular schools there are barely one hundred and fifty teachers who have passed an Examination higher than the Lower Secondary Examination, is a problem deserving the most careful consideration. The minimum qualification of a teacher teaching the two highest classes in an A. V. School should be the old F. A. or Intermediate Examination or the present first year B.A. Examination. In the two hundred A. V. Schools in 1916-17 there were 8 graduates and 12 F. A's. The matriculates numbered 130 and 352 had passed the Madras Middle School or the Mysore Lower Secondary Examination. It is the common experience of Head-masters of High Schools that among the pupils admitted into the Fourth Form, boys coming from Taluk schools are, as a rule, inferior to those coming from schools at District Head-quarter stations. Therefore the number of vernacular schools selected for conversion into Anglo-Vernacular schools from year to year, should depend entirely on the number of competent teachers available for them.

The course is to be one of four years. It is very doubtful whether a four years' study of English, unless the subject is taught by very competent teachers, will qualify a pupil to follow with profit to himself the subjects taught in english in the High School classes. In the Maharaja's College and in the Maharani's College it was for some time the practice to give an extra year in the Fourth Form to a large proportion of pupils admitted into those colleges. Until, therefore, arrangements are made to give the option of taking the vernacular as the medium of instruction in High Schools or to open a preparatory class below the Fourth Form in High Schools or it is possible to provide thoroughly competent teachers for all the A. V. Schools, it is undesirable to shorten the course in A. V. Schools.

It is suggested that exemption may be given to such pupils as do not desire to take up English in the Anglo-Vernacular schools. For such pupils some substitute for English would have to be provided. The most suitable substitute in Boys' schools would be Industrial subjects. It would, therefore, be necessary to train a sufficient number of Industrial Teachers before converting vernacular into Anglo-Vernacular schools.

In the list of Model Equipment for Secondary schools a Tellurian at a cost of Rs. 113 is included. A Tellurian is too complicate to remain in proper order for any appreciable length of time. Its omission, therefore, makes hardly any difference. Ball frames and kindergarten gifts and materials seem to be out of place in a purely secondary school.

MEDIUM OF INSTRUCTION.

Knowledge is acquired far more easily through one's own vernacular than through a foreign language. Full recognition is given to this principle in the Lower Secondary stage where all subjects except English as a language and Elementary Mathematics are permitted to be taught through vernacular text-books. If the High School courses are vernacularised, transition from the Lower Secondary to the High School stage does become easy, but at the same time transition from the High School stage to the Collegiate grade becomes difficult. Students who have studied Elementary Mathematics and Science through vernacular text-books, will find themselves severely handicapped when they have to grapple with English text-books in those subjects for their advanced courses in colleges. The difficulty will be even greater in the case of those entering Professional colleges like the Medical and Engineering colleges. It will thus be seen that while the

introduction of the Vernacular as the medium of instruction in English High Schools will be greatly to the advantage of those whose studies generally end with the completion of the High School course, it will operate as a great hardship in the case of those who use the High School course as a stepping stone to higher courses. The difficulty of replacing habits of studying and thinking through the vernacular by habits of studying and thinking through English, has thus to be faced at some stage and under present arrangements it is faced at the stage at which it can be most easily overcome. The course best in the present circumstances appears to be—to begin with the Government High Schools at Bangalore and Mysore where without dislocating existing arrangements some if not all non-language subjects, can be taught through the medium of the Vernacular in one or more sections according to need. If the arrangement proves popular, there can be little objection to its adoption in other High Schools.

Education of Girls and Women.

It is an oft-repeated fact that the Education of women has not made satisfactory progress. One thing that can give a powerful impetus to higher education among girls more than any other, is the provision of an adequate supply of competent women teachers. While the percentage of girls in the Lower Primary stage exceeds the percentage of boys in that stage and is almost the same as that of boys in the middle vernacular stage, it is less than a half of that of boys in the middle English stage and less than a ninth in the High School stage. In 1916-17, there were 592 girls in A. V. I, 186 in A. V. II, 126 in A. V. III, 103 in A. V. IV, 109 in A. V. V, 14 in Form IV, 17 in Form V, and 16 in Form VI. These figures show that girls seldom go to school beyond a certain age unless they can afford to do so or are compelled to earn their livelihood. The latter class of pupils find the sanctioned scale of scholarships ranging from Rs. 3 to Rs. 10 utterly insufficient to meet the cost of their education. Further there is little difference between the expenses of a girl in the IV Form and of another in the VI Form. A fairly liberal scale of scholarships seems to be, therefore, necessary if it is desired to secure an appreciable increase in the number of girls attending English Middle and High Schools. Some such scale as the following would appear to be adequate at present.

	Class or Standard	Number	Rate Rs.	Cost Rs. p. m.
English	VI Form ...	20		
	V Form ...	30	15	1,350
	IV Form ...	40		
	III Form ...	60	8	480
	II Form ...	50	5	250
	I Form ...	40	3	120
Vernacular	U.S.First or Sec.year.	25	12	300
	Lower Secondary ...	60	3	180
				2,680

or Rs. 32,160 per annum

Training Institutions.

The problem of the supply of teachers for Primary schools requires a little attention. For the ten thousand Primary schools it is calculated that more than seventeen thousand teachers will be required. The secondary school will be the only source of supply. Whether from among those that pass from the six hundred secondary schools a sufficient number will be available annually for employment as teachers, is a point for consideration. This difficulty also would point to the need for a large increase in the number of secondary schools.

In the arrangements proposed for the raining of teachers, it is proposed to include 30 temporary classes for training pupil-eachers. The term *pupil-teachers* requires o be defined, as there do not seem to be any pupil-teachers at present in any of the existing schools. Here again the task of finding 320 eachers competent to give satisfactory *raining to other teachers seems to be not an* easy one. If the best available teachers are drawn away from the existing secondary schools, the secondary schools will be further weakened by this arrangement. It is not clear how four teachers having four classes o teach are expected to devote the time equired to train twenty teachers. When arrangements for training teachers on such a large scale are under consideration, it is very desirable that two or three enthusiastic Head-masters of District Normal Schools should be sent on deputation to America to study at first hand for a period of about six months the organization and working of ypical Elementary Schools and employed on heir return in the work of organizing and supervising the training classes.

The main lines of research of the chemical section of the Madras Agricultural Department last year may be described in two words as 'Phosphates' and 'Malt.' "The mportance of the first," says the Report of he Director, "lies in the fact that a crying need for almost all crops in Southern India s phosphoric acid, and that we have in the Trichinopoly phosphate deposits, an enormous potential store of this material though not in a form 'available' for the needs of the plant. Research is devoted to ascertaining how this 'availability' can be secured, and the problem is being attacked along bacterial and chemical lines. The work on 'malt' developed out of the preparations that were exhibited at the Madras Exhibition in 1917, and promises most interesting results, both rom what the public usually describe as the scientific and the practical point of view."

FEMALE EDUCATION IN INDIA*

Introductory.

ON the 12th October, 1915, a memorial on the subject of the education of girls in India was presented to His Majesty's Secretary of State for India by an influential deputation. The memorial emphasised points which had long caused anxiety to the Government of India—the insignificant number of girls under instruction, the disparity in this respect of the condition of the male and female portions of the population and the consequent danger to the social well-being of the Indian community. It recommended the formation of a representative committee to enquire into the whole subject. Mr. Chamberlain, in welcoming the deputation and agreeing with it as to the importance of the subject, observed that similar representations had apparently not been made in India, indicated that the times were not propitious for the launching of schemes which carried serious financial consequences and left the question of a committee to be decided by the Government of India. The memorial was forwarded by the Secretary of State with his Public despatch No. 191, dated the 5th November, 1915. The Government of India deemed it preferable to invite local Governments to obtain the opinions of competent persons, local bodies, existing committees and other authorities and to forward them with an expression of their own views. The replies have been received and furnish a mass of valuable evidence upon a difficult subject.

It was the intention of the Government of India to place their views on this important subject together with those of the local Governments before the public by *means of a Resolution.* Various causes led them to postpone this action. The issues connected with the education of boys, which,

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* Resolution of the Government of India, Department of Education No. 1078 dated 1st Oct. 1919.

as explained in their circular letter No. 750, dated the 2nd September, 1918, had long been under consideration, the question of organization raised by the Report on Indian Constitutional Reforms, and finally the desire to await the views of the Calcutta University Commission, all these afforded ample reason for delaying their pronouncement upon so vital and so difficult a matter. Though these causes still to some extent operate, it is now possible roughly to forecast the influences which will affect education, and the Government of India are no longer willing to withhold their pronouncement upon the conclusions at which they have arrived. The replies sent by local Governments with their enclosures run to great length. It has, therefore, been decided not to reprint them, though it is possible that some local Governments may desire to publish them. The views of the Calcutta University Commission are now public property and an off-print of the chapters dealing with the education of women has been made.

Need for Elasticity.

Even now those conclusions can be put forward only with the reserve demanded in a subject regarding which it is difficult to dogmatise for the whole of India. In their Resolution No. 301-C. D., dated the 21st February, 1913, the Government of India recognized that the existing customs and ideas opposed to the education of girls require different handling in different parts of the country and hesitated to lay down general lines of policy which might hamper local Governments. They contented themselves with commending five points for consideration. They adhere to those general propositions, which, especially that regarding the type of education to be imparted, will be found repeated in the present Resolution also.

Causes of Backwardness.

The difficulties which retard the education of girls in India are too well-known to require elaborate repetition. The Calcutta University Commission have emphasised those arising from early marriage, *purda* and the distrust of western education. In doing so, they have described the condition of things prevalent in Bengal. Not all those difficulties are found or at least found in an equal degree in all parts of India, in some of which, for instance, the institution of *purda* is for the most part unknown. But the extent to which obstacles arising from these causes, from conservatism, from ideas of caste, etc., influence the result, is evident from the fact that only 0·9 per cent of the Hindu female population in India and 1·1 per cent of the Mohamedan is under instruction; while among Europeans and Anglo-Indians, Indian Christians and Parsees, the percentages are 23, 8·3 and 14·6 respectively. The paucity of educated girls in the larger communities is a matter of profound concern to the Government, as it was to the deputation which waited upon the Secretary of State. The disparity between the numbers respectively of boys and girls under education constitutes, as that deputation remarked, a grave danger to social well-being. The problem is as yet hardly an educational one. It has its roots in the very fabric of society and only a radical change in the life, customs and ideals of the country will effect its solution.

Recent Progress.

Nevertheless the progress that has been made is far from negligible. The total number of girls at school at the time of the Education Commission of 1882 was 127,000. In 1915-16—the year in which the deputation waited upon the Secretary of State—it was 1,186,000 and in 1917-18 it was 1,264,000. Expansion in recent years has been partially checked by the effects of the war. But it is noticeable that in ten years between 1907 and 1917 the number almost doubled. In 1882, again, the proportion of girls to boys under instruction was 1 to 20. In 1917-18, it was 1 to 5·3. This expansion has been

due largely to the labours and enthusiasm of a number of philanthropic individuals and societies and partly to a gradual improvement in public sentiment in some of the urban areas. It is also largely due to the constant pressure and perseverance of the educational officers of Government, male and female, who in the face of much discouragement have maintained their efforts for further development—sometimes in the face of apathy and suspicion. The question has been reviewed from time to time, as by the Commission of 1882 and in the Government of India resolutions of 1904 and 1913. Programmes of expansion were requested from the local Governments in 1911 and 1913 and the subject has been carefully considered in recent years by the provincial Governments. Conferences have been held, opinions collected, policies outlined, special committees appointed, new schools opened, new arrangements made for training and inspection and new subjects introduced into the curricula.

Hopeful Signs for the Future.

Thus the expansion in numbers has grown with enhanced rapidity in recent periods and the interest taken in the subject has increased. It is on the interest evinced by the public in the education of girls that future development primarily depends. As the Calcutta University Commission have pointed out, the paucity of private effort (as distinct from Government and missionary effort) in the matter of the post-elementary training of girls which characterises Bengal is not discoverable in all parts of India; and in the city of Bombay alone there are nine private high schools for girls. Indeed in some parts of the Bombay Presidency private effort has manifested itself in a remarkable manner. The success of two women's colleges in Madras is conspicuous and significant. Improvements in the quality of the education of the male sex are calculated to produce a corresponding influence in the attitude towards the upbringing of women. The loosening in some areas of the joint family system will force younger women, no longer under the tutelage and often the conservative influence of their elders, to seek in education some equipment against the calls made upon them by a new environment. The gradual changes, social and economic, which are slowly permeating the country are bound to have their effect and will, in the course of time, more and more be reflected in public opinion.

Educational Difficulties.

Turning to certain characteristics of the educational system which are often regarded as inimical to the development of girls' education, it must be admitted that the influence of such defects as exist is very small in comparison with that of the larger causes which have been mentioned above and, with the disappearance of those causes, such defects are likely to find their own remedy. The chief difficulties which may be termed educational are the following :—

(i) The difficulty of providing an adequate supply of competent teachers. Resort is still necessary, and is for many years likely to be necessary to the employment of foreigners and members of the domiciled community. Their services are expensive. Indian Christians are also available; but in many places, it is understood, orthodox opinion prefers instruction by members of the faith professed by the majority of the pupils. Hindu and Mohamedan women adopt the teaching profession only in small numbers. The employment of men in girls' schools is generally deprecated.

(ii) The unsuitability of the curriculum. It is frequently asserted that the curriculum for girls too closely follows that for boys. Over

half a million girls are studying in boys' schools; and for these it is not easy to devise any suitable system. In secondary schools there is a tendency on the part of many parents to oppose any course save that laid down for the university matriculation. Elsewhere attempts have been made to introduce a variety of courses. The question whether these attempts go far enough is discussed below.

(iii) The dominance of the examination system. This defect prevails only in post-elementary institutions and to a much lesser extent in middle than in high and collegiate institutions. But the extent to which, at least in Bengal, it affects higher instruction is forcibly pointed out by Sir Michael Sadler's Commission. Secondary education for girls, says their Report, "labours under exceptional difficulties in Bengal; it is surrounded by prejudices: it is distorted, even more unnaturally than the education of boys, by the malign influence of the examination fetish." The Commission "feel that the schools must be saved from the desolating domination of the examination system which now mischievously influences all their work."

In addition to these three main defects, there are others of minor importance. In the following paragraphs the different grades of education will be considered and suggestions made for improvement with special reference to the difficulties mentioned in this and in preceding passages.

PRIMARY EDUCATION.

More than nine-tenths of the girls under instruction are in the primary stage. Of a total of 19,395 primary schools, 554 are managed by Government, 3,106 by local bodies, and 15,735 by private agency. Of these last, 13,067 are in receipt of aid from public funds. The Government of India have laid down the principle that local bodies should assume a more direct responsibility for the evolution and management of primary education. In their circular letter No. 873, dated the 19th September, 1916, they suggested the withdrawal, whenever this is reasonably feasible, of such restrictions as at present exist on the activities of local bodies regarding such matters as the provision of buildings, the hours of attendance, the grant of holidays, the rates of pay, the levy of fees, the disbursement of grants-in-aid, the creation and filling up of appointments, the punishment and dismissal of teachers and (subject to certain conditions) the opening and closing of schools. Difficulties have been anticipated by some of those consulted in the application of these suggestions to girls' schools. Some local bodies have not evinced much interest in the education of girls. There is a tendency to subordinate it to that of boys. Expert opinion is often lacking. On the one hand Government, on the other some special sort of agency, is regarded as a suitable organization for the management of instiutions. The Government of India have carefully considered these opinions. Where Government already manages schools, they have no desire to see the system radically altered, since the existence of such institutions evinces the interest of Government in this branch of education and sometimes results in the maintenance of model institutions. Still less do they desire to interfere with privately managed schools, the good work done by many of which they are glad to recognise. But in view of the relation between boys' and girls' education, the advisability of engaging local sentiment and interest to the utmost and the policy of strengthening local bodies by the delegation

to them of large and important functions, the Government of India maintain that those bodies, already constituted as the proper agencies for the diffusion of elementary instruction, must continue to be such in the case of girls and that upon their enthusiasm and the capability for management which they display the future of girls' primary schools will largely depend. The same remarks apply to the divisional boards recently set up in Burma where there are no district boards.

Need for the Co-operation of Ladies.

At the same time the Government of India realise that local bodies, as at present constituted, may sometimes be found lacking in zeal for girls' education and in the particular experience which would enable them successfully to handle it. There is no objection therefore to the establishment of advisory committees or to the inclusion of persons versed in the problem of girls' education as supernumerary members on the educational committees to which local bodies ordinarily delegate some portion of their functions. It is desirable that in such matters the assistance of ladies should, so far as possible, be utilised.

Lines on which Future Expansion may Proceed.

The most important matter for consideration in the education of girls is its wider expansion. Recent legislation has placed new powers in the hands of local bodies in certain provinces. In Bombay, Bengal, the United Provinces, the Punjab and Bihar and Orissa some classes of local bodies can now elect for compulsory elementary education in the case of boys; and in Bombay and the United Provinces the provision for compulsion can be extended to girls. It is hoped that these measures will bear fruit. In the meantime, however, local Governments and local bodies would do well to collaborate in the work of surveys for expansion. The Government of India are aware of the difficulties of the question. The grounds which lead to the opening of a Government or board school often consist in the belief that there is some demand for education at the centre selected. The results are sometimes disappointing and it is occasionally found necessary to close the school in order to obviate waste of funds. It is suggested that even at the risk of incurring expenditure which, in the first instance, might appear unremunerative, it would be well to create opportunities for education upon some systematised plan, such as the founding of a girls' school in every centre which contains a secondary boys' school, whether of the middle or the high grade. Other systems will doubtless suggest themselves to local Governments as guides.

Interest of Lower Classes to be Safeguarded.

In order to obviate the possibility that educational benefits may in some places be monopolised by those classes of the community which have enjoyed the larger share of them in the past, it will be necessary to keep a watchful eye upon the interests of the depressed and less fortunate classes. It is to be recognised, however, that in some cases the feeling against association with certain castes is more strongly accentuated in the case of girls than of boys. Such feeling, if it were to be ignored in favour of the principle of free admission for all, might result in the occasional collapse of a school. While, therefore, it cannot be denied that maintenance or assistance from public funds involves the right of any child to admission to an institution, some reasonable discretion to be exercised in unavoidable cases must in practice be left to local authorities and the establishment of special schools for lower castes may be found necessary in some areas.

Co-education.

Since no measure is to be overlooked which promises even a possibility of success

in prosecuting this most important object, the Government of India would emphasise not only the foundation of new schools, grant of scholarships, etc., but also the retention and, if necessary, the further development of other measures which are at present found in different provinces. Thus, over 500,000 girls study in boys' schools. The defects of such an arrangement are fully appreciated; but in default of more adequate arrangements, it seems desirable that facilities should be offered for small girls in boys' schools where girls' schools are not to be found. Such devices, however, can in no case be regarded as a substitute for the foundation of girls' schools and it is doubtful whether the offer of special grants for girls studying in boys' schools should be retained at any centre where a girls' school is opened.

ELEMENTARY CURRICULA.

The general practice hitherto has been for a local Government through its Department of Public Instruction to prescribe for adoption such courses as the department considers generally suitable, with or without a certain measure of latitude for local or individual needs. There is a good deal of public criticism of this arrangement on the grounds, *firstly*, that the courses do not allow sufficient variety and, *secondly*, that they are not properly adapted for the special use of girls. In regard to both these criticisms it is to be remembered that the bulk of the girls under primary education—over 95 per cent—are in the lower primary or most rudimentary stage of education, and that if, as is inevitable, they are first taught to read, write and figure in their own vernacular the margin for a variety of subjects either in the lower or in the upper primary stage is very narrow. The period during which girls are at school is very short and their attendance often irregular, so that out of the several additional subjects which are usually suggested for their instruction, it is impossible to expect that more than two or three at the most could be taught adequately in one school, even when teachers competent to handle them are to be found, without hopelessly overloading the curriculum and subjecting to a degree of study incompatible with their physical powers even the few girls who proceed beyond the rudimentary stages. It is, however, the duty of Departments of Public Instruction to review from time to time the schemes of study so that these may correspond as far as possible with modern ideas and local opinion and to suggest for the higher primary classes a limited number of alternative courses. For the rest, the procedure laid down in the circular of the 19th September, 1916, already alluded to, should be followed. Account should be taken of the fact that any such alternatives are meant primarily for schools where girls alone are taught and of the varying needs of different classes and tracts and of town and country; and it would add to the authority of these schemes if they could be set forth after consultation with intelligent un-official opinion. The courses having thus been devised, the local bodies concerned would be at liberty to prescribe for the classes concerned—both in their own schools and in those to which they give aid—the particular subjects to be studied, provided, of course, that the staff possesses the qualifications necessary for the teaching of those subjects.

DESIRABILITY OF SPECIAL TEXT-BOOKS; AND OF RELIGIOUS INSTRUCTION.

Two special points arise in connection with the curriculum. It is a matter for consideration whether it would not be well to produce special text-books suitable for girls in the higher classes of primary schools. In some provinces the production of special text-books is believed to have been attended with success. Second, there is a growing feeling against the exclusion of religious teaching and observances from school life, and the feeling is more accentuated in the case of girls than in that of boys. In Government and board schools such teaching cannot ordinarily be given in school hours; but the codes in several provinces admit of

facilities for religious teaching out of school hours and when there is a demand for such teaching local arrangements may be made as far as possible to meet it. In Hindu schools the teaching of elementary Sanskrit, of tales from the epics or of religious music is often advocated with the object of introducing a religious element into the teaching. In schools predominently Mohamedan, the reading of the Koran is demanded and facilities for this can generally be given. The Government of India are of opinion that it would not be advisable to lay down any uniform system to be followed in all localities in respect of religious teaching either for boys or for girls but they feel that in the case of girls a rather greater degree of elasticity can be given to the curriculum in this respect and local bodies should do what they reasonably can to meet genuine local sentiment in the matter.

SECONDARY EDUCATION.

Of the girls at school something less than 2 per cent are in the secondary stage, but the influence of this stage of education on the future of the country is very considerable and the problems which it presents are among the most difficult in the educational administration of the country. The managemenf of the existing secondary schools is almost entirely in private hands, Government having but few schools of its own and local bodies fewer still, though the bulk of the schools receive financial aid from Government. In the case of boys, primary education is quite as much as local bodies can undertake. They may be expected to interest themselves in girls' primary education also. In these circumstances and for various reasons they cannot be expected to do anything substantial for girls' secondary education. It will probably be necessary, therefore, that the general control and supply of funds should rest with the Government, but this need not involve the management by Government of any large number of schools. The working of secondary education among girls is a matter of some delicacy in which a special degree of elasticity and personal feeling is required which Government can seldom hope to provide as adequately as private societies or individuals, and the general form of management should as at present be of a private character, aided by funds from Government, and under Government inspection and control. It would seem advisable, where possible, to associate with the Education Department one or more advisory committees, consisting as far as possible of ladies, similar to that previously constituted by the Government of Eastern Bengal and Assam. Such committees would be unnecessary where secondary schools are under fairly effective managing boards, and the personnel of the advisory committees would largely be a repetition of that of the managing boards of the several schools. Efforts, however, might be made to induce the school authorities so to constitute their own boards as to render them, as far as possible, responsive to local public opinion as regards the character of the education to be imparted in the schools.

SECONDARY CURRICULUM.

There is no point upon which there is greater diversity of opinion than the character of the secondary education which should be imparted to girls. As in other countries, there are two main schools of thought. The difference between them is for various reasons more marked in India than elsewhere. The one school would bring up girls on lines as similar as possible to those laid down for boys and would prepare them for a university career. The other would prepare girls primarily for home life and hold that women should be educated in all that concerns enlightened mothering, a good standard of maternal physique, better care of infancy, appropriate feeding, care and management of children, effective attention to children's diseases, and generally to their physical

condition, good sanitary environment and other matters of domestic concern.

Views of the Calcutta University Commission.

This question has been discussed at length in the opinions which reached the Government of India as a result of their reference. The Government of India have also had the advantage of the views of the Calcutta University Commission on this subject and on that of the collegiate education of women. The portions of the report of the Commission which deal with this subject are chapters XIV and XXXVI, together with certain recommendations in chapter III. The condition of things, which the Commission reviewed in Bengal, is not entirely reproduced in other parts of India, although the inadequate number of girls' schools may be regarded as a common feature.

Two Types of Secondary Schools Recommended.

The Commission recognize as already in existence two types of secondary schools. They suggest that in future schools should be so organized as to meet, on the one hand, the needs of the majority who will spend their lives in the *zenana* and whose education will cease at an early age and, on the other hand, those of the small but important minority who will take to professional service or play a part in the progressive section of Indian society. Both these types would fall under the general control of a body which the Commission call the Board of Secondary and Intermediate Education. It is an important part of their proposals that this board should generally manage the education now classed as secondary and also that which at present ends with the Intermediate examination. They propose, however, for schools for the former type of girls (which they denominate *parda-nishin* schools) a special body acting under the board and consisting very largely of women. For girls of the second type they consider that the maintenance of schools of the existing pattern will still be necessary and that the standard of attainment should as nearly as possible correspond with that of boys' schools. At the same time the subjects of the course might with advantage be modified so as to avoid too sharp a differentiation between the *parda-nishin* and the non-*parda* school. The Commission have recommended the creation of a standing committee on girls' eduction which would be advisory to the Secondary and Intermediate Board and which would frame the curricula and conduct the examinations for these schools. The Government of India have not yet fully considered the various proposals of the Commission. They recognize that the creation of *parda-nishin* schools will be a matter of difficulty and of very great expense and they do not overlook the obstacles which in some parts of India have stood in the way of what is now known as the system of *zenana* classes. They fully accept, however, the two principles which underlie the proposals of the Commission, namely, the modification of the curriculum in order to suit the needs of girls and women of different classes and secondly, the utilization of the advice of ladies in formulating a snitable system of instruction. They also heartily endorse the statement of the Commission that the *parda-nishin* school will eminently be a field for the munificence of enlightened Indians, without whose aid and encouragement schools of this type are scarcely likely to come into existence or to thrive.

Effect of Examinations.

The oppressive effect of examinations upon girls has been a matter of constant complaint. The Government of India endorse the view of the Commission that in the case of *parda-nishin* schools there should be some form of examination at the end of the course, but that it should not be compulsory and that it should be differentiated from the corresponding examination for boys and conducted in

part through oral tests by competent women visiting examiners; and that in non-*parda* schools it would be the duty of the Secondary and Intermediate Board to ensure that the standards of attainment represented by the examination correspond to those of the examination for boys, though this would not imply the use of identical papers, nor preclude the use of oral tests or the weighing of records of school work, which in view of the small number of pupils concerned would be specially practicable and easy.

Importance of Middle English Schools.

The remarks made above apply especially to high schools. But for a long time to come the midle school will represent an institution of great importance in the education of girls, seeing that in view of the paucity of high schools, the great expense involved in their maintenance and the social causes which still hamper progress, the middle school is likely often to remain the only institution to which the majority of girls who desire education above the elementary stage can aspire and beyond which it will be impossible for many of them by reason of social exigencies, etc., to proceed. Opinions are divided regarding the stage at which the teaching of English should commence. This is one of those matters in which the Government of India consider that respect should be paid to local opinion. It is obvious, however, from reports which have reached them that the value of English education among girls is much appreciated and they would strongly urge upon local Governments the advisability of establishing a close network of Anglo-vernacular middle schools which will provide women suitable for training as teachers of lower classes and will perhaps more than any other type of institution disseminate an interest in the advancement of girls' education.

Collegiate Education.

The number of girls at present studying in Arts Colleges is 914. The Calcutta University Commission have declared that the intermediate classes do not properly form a part of collegiate or university education. If this proposition is accepted (and it had previously been put forward by various authorities in India) then the number of girls who are doing real university work is infinitesimal—in the three colleges in Calcutta the Commission found that there are only 53 students attempting such work. The Government of India, however, are impressed with the succes (already mentioned) of the two women's colleges in Madras.

Calcutta University Commission's Recommendations.

Among the recommendations of the Commission are the following. In view of the small number of girls concerned, the work of the intermediate and degree stages might continue to be carried on under the same direction and by the same teachers, though, so far as possible, the intermediate work should be done by school methods and should also be developed at some selected high schools. There is need for inclusion in university courses for girls of subjects which are likely to appeal specially to women. A Board should be constituted in the reorganized University of Calcutta on lines (similar to the standing committee advisory to the Board of Secondary and Intermediate Educaion), which would organize the provision of advanced education and make proposals regarding the adaptation of the degree courses to the needs of women, subject to the approval of the academic authorities of the University. On the difficult subject of economy in university training for women the Commission emphasise the need of co-operation among the colleges. They consider that, while university classes should as a matter of principle be open to qualified women students, under existing circumstances such facilities will be very little used. The conditions which prevail in Bengal in this respect are not to be found in

all portions of India. In Bombay and elsewhere a certain number of women study in men's colleges and this is particularly the case in professional colleges. The Government of India, however, fully realize the desirability of instituting separate collegiate institutions for women staffed by women, but with arrangements, if necessary, for lectures in certain subjects by the professors of neighbouring men's colleges. Their views upon the other recommendations of the Commission must naturally await the consideration of the Commission's proposals for university education as a whole.

TRAINING OF TEACHERS.

It is desired on all hands that schools should be staffed by trained women teachers; but the number of Indian ladies who are willing to teach or capable of doing so is yet limited. The number of those under training has indeed shown an appreciable increase during recent years and now stands at 3,096 as against 2,234 in 1915. These numbers, however, are altogether inadequate. It is, therefore, often unavoidable to employ to a large extent the services of mission societies of English ladies specially recruited and trained, of members of the domiciled community and of Indian Christians. The labours of these classes of workers are responsible for much of the progress which has already been made. Naturally, however, there is a feeling in many quarters that Indian girls should be instructed by those of their own race and creed. A considerable number of European ladies at present employed in education in India are actually engaged in the preparation of Indian women for this profession.

SOURCES OF SUPPLY.

The Calcutta University Commission recognize that women teachers of two types are required—those capable of doing high school work and of teaching through the medium of English and those who teach in primary schools and the lower classes of secondary schools. The Government of India consider that the supply of the second class of teachers will best be met from among the pupils of the middle schools which they would like to see established after the pupils have undergone a supplementary course of training; and from the widows' homes which have been established in several parts of India. These sources of supply, however, should not be utilized to the exclusion of the existing training schools, which, on a limited scale, are doing most useful work.

As regards teachers of higher type, the Commisison recognize that, if their programme of development is to be carried out, the necessary recruits can at present only be obtained from Britain or America. This remark, however (written in application to the Presidency of Bengal, though undoubtedly applicable to a large degree elsewhere), is tempered by the recognition that the more orthodox section of Indian society fears the unsettling influence of western women and that for the *parada-nishin* type of schools there must be a large increase in the number of well-educated Indian women teachers. The Government of India are fully alive to the advantage of supplementing the efforts of Government by the service of competent private bodies in the task of training women teachers. They incline also to the view of the Commission that this work should not be treated as apart, that it can be carried on as a portion of the ordinary teaching work of schools and university courses and that education may fitly form a subject in the courses leading to the intermediate and degree stages. In this connection, the following passage from chapter XXXVI of the Commission's Report is quoted:—

"We would suggest (1) that post-graduate classes in the university department of education which we shall propose should be thrown open to women equally with men; (2) that education should be introduced as one of the subjects for the degree, and that

nstruction for this purpose should be provided by the three Calcutta women's colleges n co-operation; (3) that an introduction to the methods of teaching should be also made one of the possible subjects at the intermediate stage, as has already been suggested in the case of intermediate colleges for men, and that this option should be offered in all the women's colleges; (4) that training for the L. T. diploma and for the B. T. degree should be given in the women's colleges on a co-operative system, under the direction and advice of the university department of education, which might afford much assistance."

PROFESSIONAL TRAINING.

Apart from the training of teachers it has been recognized by many authorities, including the Calcutta University Commission, that the profession, in which there is greatest need for women is the medical. After discussing the difficulties of the situation and the proposal, now abandoned, to exclude women from the Calcutta Medical College, the Commission conclude that all the existing arrangements are little better than makeshifts and that until Hindu and Mussalman society has materially modified its attitude on the training of women no real solution for this problem will be possible. They consider, however, that one obstacle should be removed, namely, the difficulty of obtaining the requisite preliminary training. While it would be very expensive to provide this in any single college it might be possible to make use of some of the teachers in the laboratories provided for men in the preliminary medical subjects. These suggestions are endorsed by the Government of India and the attention of the Governments both of Bengal and of other presidencies and provinces is invited to them.

CONCLUSION.

In some of the opinions received by the Government of India it is contended that the progress of female education is not primarily a matter of money but of social development and it is urged that in many cases schools have been opened but have failed to attract scholars. By many others it is held that the expansion of girls' education is mainly a matter of finance and that if only more money can be spent on schools and on the training of teachers the number of scholars will rapidly advance. There are doubtless parts of the country in which the former of these views is a correct representation of facts. There are tracts, however, where substantial sums of money can be spent usefully in starting new schools, in strengthening the Inspectorate, in experimenting with widows' homes. secondary schools of the types described above, and the like. Where anything can be done by the expenditure of money in such cases it is hoped that local Governments and local bodies will be liberal in doing what their resources permit. At its present stage the education of girls needs more financial fostering than that of boys: primary education must mainly be free; scholarships and studentships must be given more lavishly; grants-in-aid must be calculated more generously; and the greater expensiveness of secondary education has to be practically recognized. For part of the expenditure involved it is hoped that private endowments may be forthcoming, and so far as public money is required the responsibility rests primarly with the provincial governments and the local bodies concerned. The Government of India have of late years given considerable grants to help in various educational activities, more especially in primary education and the training of teachers and the utilzation of these grants is by no means confined to the education of boys. But since the impending changes in the relations between Imperial and Provincial finance will in all probability involve the complete dissociation of the former from educational expenditure in the provinces, the provincial and local agencies will become not merely primarily but exclusively responsible for the future development of the

education of girls. It will rest with them to decide how far they will be able to devote public money to furthering this form of eduction, and it is hoped that the suggestions which have been put forward in the preceding paragraphs will be of assistance in indicating the objects on which such money can most usefully be spent and the directions in which the education of girls can most profitably be guided. Hitherto the difficulty has often been not so much in the actual provision of funds as in the discovery of opportunity for their fruitful expenditure. There can be little doubt that in future such opportunities will largely increase. Although it has to be admitted that the total number of girls under education is at present infinitesimal, the progress made in the last few years is significant, the interest now evinced in the subject is a hopeful sign and the enhanced rate of development in the education of boys, especially in its higher branches, is bound to influence favourably the popular attitude towards the education of girls. There is every reason, therefore, to hope that the demand for girls' education and the supply of means to foster its growth may in the future so react upon each other as to provide for an early and substantial development of this important factor in the progress of India.

It is announced by the Government of India Department of Commerce and Industries for general information that all restrictions on the export of mica have now been removed. Exports of all sizes and qualities are now permitted without licence to any destination.

SALVAGING THE SCRAP HEAP.[1]

By Johnson Heywood.

After everything possible has been done to prevent making scrap, it becomes necessary to realize the greatest possible value out of such material as has found its way to the scrap pile.

This can be done in one of three ways, depending upon the product and the nature of the scrap:

1. A way may sometimes be found to utilize the waste material in the product.
2. New products may be added for which the scrap can be used as the raw material.
3. Steps may be taken to make the scrap worth more when they are sold.

The way one shop utilised its cast-iron chips and borings is an example of the first method. It had been the custom to dispose of this waste to the junkman, but when the price of No. 2 pig iron went to $48 a ton, and the borings brought only $8, even before freight was deducted, a serious attempt was made to remelt this scrap in the shop cupola.

It was soon found, though, that chips and borings thrown into the cupola buried up instead of becoming molten. All castings poured from a mix containing even 5 per cent of such borings were either badly pitted or else filled with spots so hard that to machine them was impossible.

Handling Chips and Borings.

The problem this shop faced, therefore, was how to heat the chips and borings slowly enough to cause them to melt, but not burn.

[1] With Acknowledgments to *Factory, the Magazine of Management.*

Borings could, of course, be heated separately from the pig and scrap iron in a small blast furnace, but the additional cost of this double handling made the method inadvisable.

It was decided to put the borings under pressure and press them into a solid mass resembling an ingot, so an experimental press was rigged up. A hollow steel container about 20 inches long, with an inside diameter of 6 inches, and open at both ends, is secured to a movable slide, which keeps the container always centred below the ram which is attached to the headblock. A steel slab, 1½ by 7 by 15 inches, in one end of which is a circular opening, 6½ inches in diameter, is so placed on the ram-cap of the press that either the opening or the solid end may be slid under the container.

This container is charged by means of a sheet-metal hopper which contains several hundred pounds of chips and borings. The flow is actuated by gravity and controlled by a simple sliding gate. After the container has been filled, a small quantity of salt water is added and the contents rammed by hand. Pressure of approximately 6,000 pounds to the square inch is then applied. When compression has ceased the pressure is removed, the steel slab on the ram-cap moved so that the opening in the slab is directly below the opening in the container. Pressure is again applied and the borings are forced out of the container through the opening in the slab to a receptacle below. The salt water causes rapid oxidation of the iron and in 12 hours the borings are dry, the mass hard and in a shape that is easily handled.

Borings in this form were made the object of several experiments, and a mix containing 25 per cent of pressed borings was poured with excellent results.

From this small and rather crude arrangement a 50-pound block is pressed every two minutes, or approximately seven tons a day, at a total labor and expense cost of $1.10 a ton. When this method was first put into effect, loose borings brought only $8 a ton. Therefore, considering the total cost to be $9·10 a ton, we have the following cost of the new mix containing pressed borings.

In an average daily "pour" of 30 tons. there is used:

55% No. 2 pig iron ...	16·5 tons at	$48 00 =	$792 00
25% pressed borings ...	7·5 tons at	9 10 =	68 25
20% scrap iron ...	6·0 tons at	15 00 =	90 00
100%	30·0 tons		950 25

Prior to using the pressed borings, the mix contained:

60% pig iron ...	18 tons at	$48 00 =	$864 00
40% scrap iron ...	12 tons at	15 00 =	180 00
100%	30		1,044 00

This gives an average daily saving of $ 93·75 by this simple plan.

Widely different in method but the same fundamentally is the way one automobile manufacturer used the packing cases in which some parts of his car are received. When he realized the great amount of good lumber being thrown out daily after these cases were unpacked, he drew up a careful set of drawings and specifications, and demanded that his supplier make all further cases to meet his needs.

He made slight changes in the dimensions, insisted that the cases be put together with screws instead of nails, and even specified the size of screws to be used and the exact location of every screw hole. When the accessory supplier received the specifications covering the cases, he agreed to ship in them but at a considerable increase in price.

PUTTING BOXES TO GOOD USE.

The automobile maker was willing to pay extra for them, for by simply disassembling the packing cases, he is now able to use the sides, tops, and bottoms for floor boards for his cars without performing an operation on them. They fit even to the screw holes and the screws come with them. Thus he not only is saved the expense of making the floor boards but does not have a lot of practically worthless packing cases to dispose of.

In a hat factory waste ribbon is now used to take the place of material that formerly was purchased.

After the band of ribbon is put around the crown, a bow is sewed on the left side as a finishing touch. This requires two kinds of ribbon—what is known as 11-line and 12-line—one for the banding and the other for the bow.

Ribbon for the bands comes in rolls of approximately six yards, which leaves over a piece from four to six inches long on each roll which ordinarily is either thrown away or collected and sold for scrap.

Investigation showed that this piece could be used in making the cross-piece of the bow in place of the bow ribbon which was formerly used. Since a roll of ribbon bands a dozen hats, it is now possible to use the waste piece on one out of every four hats. In this hat factory, which turns out a normal production of 200 dozen hats a day the year round, the saving is about 6,000 yards of bow ribbon in a year.

In some instances material is so completely wasted that the scrap or waste is not even visible. The sewer or the river is the scrap pile.

That is particularly true in those industries using acids, chemicals and sundry materials of that sort. The savings to be made by reclaiming them is often well worth while because of their ordinarily high cost.

WASTE OF ENAMEL.

A recent experience in an enamelware factory illustrates quite forcibly the undeveloped possibilities that often exist.

It was noticed that after the second coat of enamel had been applied, a girl wiped, with a wet sponge, the beaded edge of the various articles coated, so as to make it possible to apply an enamel of some other color on the bead.

The sponge was continually rinsed, and the enamel that had accumulated on it allowed to run to the sewer.

To prevent this, separate pails filled with water are now given to each operator, with instructions that she rinse her sponge in the pail. Several times a day the contents of the pails are poured into a larger receptacle. The enamel settles to the bottom, making it easy to siphon off the water.

A test was made for several weeks and it was found that 2·87 per cent of the enamel used was reclaimed in this fashion. Furthermore, the enamel was ready for immediate reuse. It loses none of its properties.

Such a method is applicable to many industries. In fact, one superintendent says that in his business running water and the sewer are the greatest encouragers of material waste.

Quite similar is the saving of ink made in some printing plants. It may be worth telling to show how nearly universal the method is.

In large printing establishments the ink is "dipped" out of cans and applied to the ink plate of the presses. This "dipping" process almost invariably leaves a fraction of the ink, which is of a heavy consistency, in the can, around the sides and on the bottom. The cans can be soaked in a solution, which in turn is poured into a concentrating tub or larger can. When the ink has settled to the bottom the solution can be poured off and the ink used.

INTENSIVE STUDY BRINGS RESULTS.

Usually a little intensive study of the product, keeping in mind the waste, will show many ways of utilizing the waste. For example, there is the tinware manufacturer who punches the spouts for tea-kettles from the odd-shaped pieces of metal that come from the blanking presses. This same plant had been cutting sheets of metal into strips to bind its export cases, while at the same time strips made in the plant were being baled and sold as scrap, as described in the last article.

In a wagon factory a sawyer stood all day at his cut-off saw, making short pieces of wood out of long ones for spokes. In another part of the plant another man was cutting other long pieces into very short ones for another purpose.

The first operator could cut very few of his pieces exactly without waste. Every night the janitors carted out hundreds of short ends to the boiler room. And all the time these short ends could, depending on their length, have been used for any of a half-dozen parts that other sawyers were cutting from long lengths. This is not an uncommon occurrence elsewhere.

To-day each sawyer is given a list of the length of pieces used throughout the shop and he plans his cutting of each length with this in view. Practically nothing goes to the furnace now but sawdust and pieces an inch or two long.

It must be remembered, however, that sometimes it costs more in labour to use the odd left-over pieces of material than they are worth. This is easy to determine if the concern has a proper cost system.

Frequently it is desirable to take on a new line of product solely to use up the odd scraps of material that cannot be used in the principal product.

A glove maker, for instance, found that no matter how carefully his cutters planned to use up the skins, it was impossible to avoid leaving over great numbers of small pieces that could not be used in gloves. So he now makes them up into leather pen-knife cases, watch covers and small change purses and gets a higher price for them per square inch of skin than he gets for his gloves. Formerly these scraps of skin had absolutely no value.

A counterpane manufacturer cut from each corner of his counterpanes a nearly square piece of cloth, containing about 70 square inches, so that the counterpanes would fit around the bedposts. That is 280 square inches for each unit of product and amounts to many hundreds of dollars a year in raw material. The corners were formerly sold to paper mills.

A few cents labor on each now turns them into babies' bibs and they bring nearly 100 times as much a pound of material as he formerly received from the paper mill.

Putting Wood Waste to Use.

Farm implements and butchers' blocks may seem to be products too diversified to go well together; yet a farm implement manufacturer gets a handsome price for his wood waste in the form of blocks. The wood is all in very small pieces of high quality hardwood. These pieces are covered thoroughly with glue and compressed in heavy presses to make the butcher blocks.

Some furniture manufacturers use short ends and scraps of wood to make children's tops, alphabet blocks and other wooden toys. One showcase concern has a waste of a great deal of broken glass and small pieces left over after cutting. This is used to make leaded glass fronts for bookcases, as well as windows. There is as much profit in these leaded panes as in the regular product.

It is perhaps trite to refer to the often mentioned outlets the meat packers have found for the hair, hoofs and other wastes incident to manufacturing meat. But the fact remains that nothing which comes into the packing plants as raw material leaves as waste or scrap. It is all finished product which sells at a good price, whether it be lamb chops, fertilizer, porterhouse steak, hair mattresses, sweet-breads or violin strings. It might pay any manufacturer to visit a packing plant in the hope that he would be inspired to see new ways to utilize his waste materials.

The opportunity for taking on new lines of product to match the material wasted in making the existing one is present in nearly every industry. The trouble is that most manufacturers cannot be expected to know all about every other product different from

his own that finds a sufficient demand in the market.

Therefore it frequently pays to call in outside help. A few hundred dollars spent for the services of a consulting chemist will frequently result in finding a use or a profitable outside market for a seemingly useless scrap or by-product.

A gas company, for example, had a waste liquid analyzed and found it to be the basis for the new high explosive, TNT, and worth several dollars a pound. It had been going down the sewer.

A tanner had been allowing a waste product to go into the river until a chemist told him that it was a coagulant which is used in filtration plants.

Industrial engineers, too, are often able to point out uses for scrap because of their familiarity with other industries and their knowledge of the raw materials used in most products.

SELLING THE SCRAP.

This brings us to the third method of salvaging—that is to sell the scrap for the most that it will bring. As just shown, it is sometimes possible to find that the, to you worthless scrap is the valued raw material of another industry. That means that by selling it direct to those who need it, it is often possible to get a considerably higher price than the junkman will give.

For instance, spring steel of high quality is an expensive material to throw away. Automobile springs are pointed by cutting two triangular pieces from each end. This waste amounted to many thousand pounds a year, which as scrap brought comparatively nothing.

It happened that this spring maker employed an industrial engineer who had had experience in a farm-implement plant. He suggested that these triangular pieces of spring steel could be well used for the teeth of spring-tooth harrows. Negotiations were opened, resulting in a permanent agreement that the harrow concern would take the entire output of spring steel scrap. It not only served the purpose but the shape of the pieces saved considerable cutting and other labor in the harrow plant. This is one way to realize a higher price on scrap that must be sold.

A good deal of attention is being given in up-to-date plants to the reclamation of materials and supplies that were formerly regarded as useless scrap and which were sold at an insignificant figure. There are many instances of savings, secured by an intelligent study of this problem, which vary from a few hundred dollars in smaller plants up to the hundreds of thousands salvaged annnually by some of the larger industries.

It is safe to say that no plant is entirely free from a constant accumulation of miscellaneous "junk," such as discarded tool steel, worn out shafting, broken castings, bolts and nuts with bruised threads, and a thousand and one things which are cast aside because they do not serve any useful purpose in their existing condition. An examination of the typical shop usually shows piles of such discredited articles lying under machines and in out-of-the-way corners, where they sometimes remain unmolested for years. Also many storerooms are simply junk piles of obsoleted or worn-out tools and jigs.

HOW JUNK IS HANDLED.

One plant has solved this problem by establishing an enclosure near the storeroom, where all discarded articles are delivered before any disposition is made of them. No foreman is allowed to retain in his department any tools, equipment, materials, or supplies which are not serving, or capable, in their existing form, of serving some necessary useful purpose.

All such articles are sent to the scrap room, where they are examined by the master mechanic. He determines their value and decides what can be salvaged and what must be disposed of as scrap.

The plant operates a repair department, where a number of machine tools are installed. Damaged bolts are cut off, or turned down or rethreaded; discarded pieces of shafting are selected for work requiring smaller diameters; broken drills are cut off and repointed; and an endles number of other articles are converted into useful forms.

Here again judgment must be used, for it is easily possible to spend more on reclaiming the scrap than the tool would cost new. A simple formula will show whether it pays to rework old tools and supplies of this nature. It is: If the labour cost of reclaiming, plus the scrap value of the material, is greater than the cost of new tools or supplies, it does not pay.

Materials and supplies which cannot be reclaimed if sorted out can usually be sold at prices much above those which could be obtained for miscellaneous unsorted scrap.

This plan of classifying scrap yields a high return often. Take rags, for instance, which are readily salable to paper mills. Some kinds of selected rags are worth four or five times what the same rags are worth mixed with others. On one day this year, for instance, the quotation on "new shirt cuttings" was $12·25 per hundred pounds; "blue cotton," $8·25; while mixed rags sold for about $3.

Waste paper is another instance. When certain grades of waste paper sell at from $1·50 to $6 per hundred pounds, the same papers mixed sell at 65 to 75 cents.

In the metals the same holds true. Tool steels worth several dollars a pound will bring but a few cents if mixed with other grades of steel and iron.

As a low grade of common labour suffices to sort out scrap, it is usually well worth the expense involved. Of course it is well to consult trade papers or those conversant with the trade to determine just what classification and selection of scrap should be carried out.

In nearly any plant it is worth while to study the scrap pile closely and decide which of the three methods of getting a higher price for scrap shall be used. Often, in fact usually, all these may be used successfully to yield dollars.

AGRICULTURE AND CO-OPERATION.*

By Dr. John Mathai, D.Sc.,

Asst. Registrar of Co-operative Societies, Madras.

THE task of rural development in this Presidency is entrusted by Government to Departments of Agriculture and Co-operation jointly. The Department of Agriculture is in charge of the supremely important duty of investigating scientifically the possibility of improving the methods, processes, instruments and raw materials of agriculture, of demonstrating the results of the investigation to agriculture and of imparting instruction in agriculture. The Department of Co-operation is entrusted with the duty of combining agriculturists into organized societies for the purpose of improving their economic condition by the joint supply of capital, raw materials and implements, by the joint preparation of their produce for the market, and by the joint marketing of the produce. The two departments are obviously complementary to each other. One is concerned mainly with investigation and technical instruction, and the other with organization.

The term 'co-operation' is apt to convey a rather narrow view of the possible scope of the co-operative department. It would be better expressed probably by the title which is in use in the United Kingdom, namely, Agricultural Organization. The word 'co-operation' as used in the manufacturing industry denotes a method of organization, distinct from the competitive, mechanical, large scale system, which is the prevailing, or, to use a rather misleading word, the natural system in that industry. The co-operative movement arose as a protest against that system. But in agriculture,

*Paper read at the Agricultural Conference, Coimbatore, on Dec. 16, 1919.

co-operation was introduced not as an alternative to a prevailing method of organization but as an alternative to no organization at all. The statement is probably not absolutely accurate, but to a large extent it represents the truth.

The point of the distinction may be restated thus: In the manufacturing industry co-operation stands for a different ideal of social progress from ordinary joint-stock enterprise. In co-operation the test of progress is primarily the welfare of the human factors engaged in production. In ordinary commercial enterprise, the test is rather the output, or the aggregate amount of finished produce. This, however, does not mean that in every joint-stock enterprise, the welfare of the worker is neglected or, that in every co-operative undertaking the output is necessarily smaller. But it is true in the main that, if your chief aim is to increase the output of your industry you generally start by centralising capital and control. But, if your chief aim is not to increase output but rather to increase the happiness of the community, then you try to distribute capital and management on as wide a basis as possible.

On the other hand, if you take agriculture, whether you judge progress by the test of welfare or by the test of output, in many countries co-operation is the only practicable method of organization. Of course, farming on a large scale as a joint-stock business has, in suitable cases, great advantages from the point of view of output. But except in new countries or in countries where feudalism has survived in some form or other, the possibility of organizing large farms is very little.

The difficulty is that unlike other forms of wealth land is strictly limited in quantity. If you take any given area which is already under cultivation, you cannot easily persuade the people who own the land to throw it into a common stock. This is especially true of a country which is occupied predominently by small agricultural holders, among whom land is the most cherished form of possession and the sense of property is most keen with regard to land. You cannot as a rule organize large joint-stock farms on the basis of single estates in a country of peasant proprietors. If people will not part with the ownership and possession of land, then you cannot get them to combine to the extent of owning and cultivating the land in common, but only to the extent of co-operation in regard to certain aspects of agriculture. This obviously sets a limit to the development of agricultural organization—a limit which is imposed by certain facts in human nature and history which, it is useless at this time of day to argue away. But within this limit there is an immense possibility of development by combination which, even in the most advanced co-operative countries, has not been explored to the fullest extent.

The necessity of co-ordinating the functions of the agricultural and co-operative departments in India is now accepted as a truism. The Committee on co-operation, over which Sir Edward Maclagan presided, made a strong point of the need for co-ordination. Their proposal was that what are called the Development Departments of Government should be placed under a single official head in order that they might function in response to a common will and policy. Whether this is a sound proposal or not, there is no doubt that the necessity of co-ordination between the various development departments to which they called attention is now generally recognised in every province. Such co-ordination has always existed informally. But in Madras the first formal step in this direction was taken in July 1917, by the holding of a joint conference between the senior officers of the two departments, a conference which, if it has not led to any substantial results capable of being measured and tabulated, has, at any rate, resulted in a perceptible awakening, on the part of agricultural co-operators, of the desire to understand and utilise the valuable discoveries of

the Agricultural Department especially in the matter of improved seed, manure and implements.

The work of the inter-departmental conference fell under two heads (*a*) general lines of work, and (*b*) suggestions for particular areas. Under the first head, it was resolved, for example, that Deputy Directors, Assistant Directors and Assistant Registrars should endeavour to meet once in every three months at least, in order to discuss matters of mutual interest. Certain lines of activity capable of general application were recommended, such as joint rotation of crop, joint storing of seed and manure, and joint irrigation; and certain manures and food-stuffs for cattle were mentioned as being fairly safe to recommend anywhere.

The really important work of the Conference, however, was the detailed survey which it made of the directions in which co-operative societies might assist in the improvement of agriculture in definite localities in the Presidency. The suggestions necessarily covered a very wide range, but they may be briefly summarised as follow: (1) Joint purchase of seed for green manure, such as daincha, sun hemp and kolinji, (2) joint purchase of artificial manure, such as bone meal, oil-cake and fish guano, (3) joint purchase of improved seed for crops like paddy and cotton, (4) joint production in respect of sugar-cane crushing, cotton ginning and groundnut decortication, and (5) joint sale of agricultural produce, especially garden produce, such as arecanut, cocoanut and pepper on the West Coast.

The actual methods by which it was sought to secure co-ordination during the year for these various objects were mainly meetings between agricultural and co-operative officers and joint tours by them, constant correspondence on points requiring expert assistance not merely between the heads of the two departments, but between the officers in charge of local areas, and the presence of agricultural officers at co-operative conferences.

It may be admitted at once that the success achieved by co-operative societies in carrying out the suggestions, and utilising the assistance, of the agricultural department has not been as considerable as we might wish. Those of us who have examined the quarterly reviews issued by the Registrar of Co-operative Societies during the year on the progress of agricultural co-operation will have noticed how slow, on the whole, the progress has been. But it is encouraging that in the quarter ending June last a perceptible improvement was noticed over the two previous quarters, especially in repect of the joint purchase of seeds and manures in certain areas. The movement for co-operative purchase, though still in its infancy, has run fairly strong during the past year in regard to certain articles and in certain localities, under the pressure of the general scarcity of food. If co-operative societies succeed in bringing home to their members the solid commercial value of agricultural improvement, it may be hoped that the tide of co-operative purchase which has set in may "lead us on to fortune" in the supply of agricultural requisites as well as of ordinary domestic articles.

The chief difficulties which beset co-operative societies in this matter were set out by Mr. Hemingway in a paper he read before this conference last year. Briefly the difficulties have been of three kinds: (1) Co-operative trade in agricultural requisites, which naturally bulks largest among the suggestions of the inter-departmental conference, is inherently a more difficult form of co-operaton than credit. It requires a knowledge of the market, it requires more discipline and business habits, and last but not least it is often attended by serious risks, such as fluctuations in price and deterioration of quality. (2) Both the agricultural and co-operative departments have been admittedly short-handed in view of the immense possibilities which lie before them. The

whole field of non-credit co-operation lies practically unexplored in the country. The experiments in the direction which have been made in recent years have been a severe strain on the existing staff, who have had to undertake them in addition to the fairly exacting work of looking after nearly 4,000 societies in the Presidency. (3) Besides these, the special difficulties of last year—transport, supply and the season—must be remembered.

Looking towards the future, one feels there are four circumstances at least on which co-operators may base their hopes of a better day. First, the definite acceptance by Government of the necessity for expanding very considerably the staff of the co-operative department; secondly, the recognition of the valuable services of non-official co-operators by the appointment of Honorary Assistant Registrars; thirdly, the rather striking application which has been given to the principle of "trade on indent," and fourthly, the establishment of the local co-operative union as a natural self-governing unit in the co-operative system.

All these are circumstances which will obviously help co-operators in the efforts they are making to strike out new lines of work especially in the direction of agricultural improvement. The increase of staff proposed will mitigate a longstanding and acknowledged difficulty. And the habit which co-operative societies are beginning to develop of buying and occasionally selling as agents of their members affords a safe basis on which trade in agricultural requisites may be developed. It is, however, on the second and fourth points that one would lay the greatest stress, namely, the definite recognition of non-official workers and the constitution of local unions.

In any movement which depends for success on the education of public opinion, the discovery of a local unit which could form the nucleus for a spontaneous grouping of people is a step of great consequence. The co-operative local union is still decidedly on its trial, but there is reason to believe that a group of societies situated in a small area, not bigger than a taluk and preferably much smaller within which people have easy access to one another and a fairly intimate sense of common interests, has in it the making of a good natural unit. It is through co-operative organizations based on such units that we must hope for a real permeation of our agricultural population with the idea of rural improvement, both on the scientific and on the social side. That is the importance of the local union, and it is potentially a great point in its favour.

It is not necessary to dilate on the importance of accepting the willing services of honorary workers in a movement like co-operation, and of strengthening their loyalty to the cause by giving them definite responsibilities and a definite status in the movement. If a sufficient number of workers of proved ability and experience in rural areas could be appointed as Honorary Assistant Registrars, the result will be that at the more important "Union" centres in the Presidency you would have not merely a co-operative organization capable of being used with great effect, but an individual on whom you could count for putting the organization to proper use.

Can anything be done to still further co-ordinate the work of the agricultural and co-operative department? We have made a good beginning towards co-ordination by holding a joint conference between the officers of the two departments—practice which, we hope, will be continued hereafter.

With regard to further steps, two questions might be raised for the consideration of the conference:

(1) Is it practicable and desirable to give short courses of instruction in improved methods of agriculture to honorary co-operative workers at one or more centres in the Presidency?

(2) Will it help agricultural propaganda if, in posting agricultural demonstrators, preference is given to places where co-operative unions have been formed?

ECONOMICS IN THE WEST.

The Railway Strike.

London, 15th October, 1919.—The great Railway Strike has come and gone. *Happily it has left no aftermath of ill feeling. On the contrary there has not been for a long time such a friendly and moderate* spirit abroad as there is to-day. The truth is that the country has realised the peril in which we stood during the recent uprising. Mr. Thomas, the railwaymen's leader has stated that we were on the verge of a revolution. That is a picturesque exaggeration. But unquestionably we were very near the point at which in most countries Civil war begins. People of all shades having looked into the abyss are not at all eager to pursue the quarrel. Even some of the extreme Labour leaders have become sweetly reasonable. Mr. Smillie, tbe Miner's Leader, for example, in the interview with the Prime Minister the other day over the question of nationalization was at particular pains to dissociate himself and his organization from Syndicalism, that extreme form of Continental Socialism which aims at an expropriation of owners, if necessary by compulsion, and the handing over of an industry to the workmen in whose interests it would be worked. The proceedings at the interview in themselves afford a very striking commentary on the present peaceful situation. Throughout the knotty problem of nationalisation was argued in a sober and almost friendly spirit and though Mr. Lloyd George was most uncompromising in his refusal of the demand for nationalisation the parties separated quite amicably. Beyond doubt the recent storm has cleared the air.

Out of evil good may come in this as in other cases. A direct result of the settlement of the dispute will probably be a serious attempt to secure a final adjustment of the differences between Capital and Labour. The Government are earnestly working to this end, and when Parliament meets a varied programme will be laid before it designed to reconcile Labour. Long before this communication appears in print some of the contemplated measures will have been presented and possibly carried. Any remarks that I can make upon the subject, therefore, would be of little value. But it is permissible for me to state my belief that it is not so much in the Parliamentary programme that we must look for the final solution as in the discussions and negotiations carried on in the background. There are several highly promising plans in the field for giving Labour what it wants "a place in the sun" with stable and adequate wages. I don't know how far these will meet with favour in Labour quarters when they are examined. Hitherto Labour of all classes has looked askance at anything in the nature of co-partnership and the prejudice against any system of the kind which tends to fix a man's employment will be hard to remove. But the stream of tendency, as Mathew Arnold would have said, is towards this method of associating Capital and Labour. It is generally foreseen that if there is to be a real rapprochement it can only be based on some scheme for dividing surplus profits.

ITS LESSONS.

Apart from the moral influences of the Strike it has been of great service to the public in demonstrating some things which before were at least obscure. One of the great lessons—perhaps the greatest lesson—taught was the extreme value of Motar Transport. Of course' the war brought this truth home, but the greatest achievements of the Military Transport Departments were abroad and if the public ever realised their importance the impression was only a fleeting one. In the Railway Strike the nation to the remotest hamlets was made to feel how all important this endless chain of motar lorries passing along the roads was to it, how far reaching were its activities and how

completely it was able to supply at all events the primary needs of the community in its hour of crisis. An immense fillip has consequently been given to the Motar Transport interest here and elsewhere. In all directions there are developments which ultimately will transform the system of travel and goods transport. Merchants and others who during the strike travelled long distances in some cases from places as remote from London as Liverpool and Manchester—and found the experience quite pleasant will next summer deliberately take to the road as an agreeable alternative to the iron track when time is not pressing. Manufacturers and Traders who consigned their goods by motar van where previously the railway alone was used have discovered the advantages of a door to door delivery and will organize a regular system of road transport.

There is no necessity to enlarge at any length upon the message which this phase of the strike has for India. Supposing that from some cause there was a break down of the railway system or of a part of it in your country what a fast motar transport would play in keeping the life of the community going! The splendid arterial roads, constructed many of them before the railway era, would hum with traffic; even in many of the byeways motor transport would be possible. During a great famine such as has been experienced in living memory when the railways proved inadequate for supplying the needs of the suffering population the invaluable motar lorry would save the situation. But it is not in times of emergency such as this that the best work would be accomplished. The proper place of motar lorries would be found in ordinary times to serve commonplace needs. In many cases they would take the place of light railways to the advantage of economy. But to have their full value they must have at their disposal good roads. No doubt in recent years a great deal of useful road construction has been mainly military rather than industrial efficiency and there is ample scope for a thoroughgoing and wide reaching system of road construction, especially in isolated districts which are not at present well served either by railways or waterways. The whole subject is of immense importance to the future prosperity of India and in the light of recent events it should be taken in hand at once.

In connection with this question of motar transport must be noticed the really startling announcement that has just appeared of the discovery of a new and inexpensive motar fuel. The statements made in the columns of the *Times* on this subject are so extraordinary as to be almost incredible. Here we are told that the fuel is produced by mixing with water a compound known only to the inventor—a South American named Andrade, of Portuguese extraction. Tests were made with the product at Nottingham on Saturday in the presence of a number of experts. "On some of the liquid being poured on to the ground it burnt steadily and emitted no smoke. The smell does not resemble that of petrol. Half a bucketful of liquid was afterwards poured into the petrol tank of Mr. Ball's car, which travelled with perfect smoothness and at a high rate of speed. More water was then added, and this seemed, if possible, to improve the running of the engine." It was stated that the car travelled thirty miles on one gallon, and that a gallon could be manufactured for five-pence. Needless to say if these results or anything approaching them can really be attained on a large scale the new motor fuel will simply revolutionise the motar industry and effect a good deal besides; because obviously a motar spirit at five pence per gallon will be infinitely cheaper than either petrol or coal. But it will be well to await further and more extensive experiments before we conclude that petrol and coal are to be driven

that the fair promise of a limited experiment has not been realised at a later period.

IMPERIAL DEPARTMENT OF INDUSTRIES.

The announcement that Sir Thomas Holland is about to proceed to India to organize the new Imperial Department of Industries has been welcomed here in all quarters interested in Indian development. It is taken as an earnest of the government's resolve to give real vitality to this all important problem. As an eminent scientist and as an able administrator Sir Thomas Holland has already shown his capacity in time of War and there is little doubt that he will be equally successful in guiding India's industrial destinies in the peaceful times which we all hope lie ahead. At the end of last week Sir Thomas gave evidence before the Joint Select Committee on the India Bill. According to the *Times* his evidence was "directed to the support of the Government of India in opposition to the proposals of the Functions Committee that the development of Industries should be a transferred subject in the provincial sphere—in other words that it should be handed over, to Indian ministers responsible to the Legislative Assembly, instead of being under the charge of the Governer's Executive Council." In this matter Sir Thomas Holland will probably find himself at variance with a great mass of instructed Indian opinion, but few will question the sincerity of his views or doubt that they are supported by strong reasons. Indians certainly will not quarrel with him because he does not see eye to eye with them. They will be content with the knowledge that they are to have from his experienced aid in perhaps the greatest practical work that has ever been undertaken in their country.

A LOST OPPORTUNITY.

The sale has just been effected to an American Syndicate of the great island site in the Strand which is perhaps the finest piece of building ground available in the whole metropolis. This transaction has recalled to me an old suggestion made in these pages that the Government of India following the example of the Dominions and of the Crown Colonies should establish a great centre in London where the commercial side of her life could be presented. In my mind's eye I had this site before me as the one most perfectly adopted for India's purposes and I pictured daily crowds of interested visitors swarming about the tastefully arranged windows gaining an invaluable lesson in the greatness and productiveness of the Indian Empire. But alas! it is not to be. This incomparable site has gone like so much else in these days to minister to the glory of the United States which does not stand in any special need of glorification at our hands. However, though this opportunity has been missed the Government of India surely will not much longer continue its attitude of splendid isolation in regard of popular commercial propoganda. There are, I am certain, enormous possibilities for good in this "shop window" form of publicity. If any one doubts it let him take his stand one day in the crowd gathered about, say the Canadian Government shop window at Charing Cross and note the remarks and attitude of the spectators.

ARNOLD WRIGHT.

The feasibility of using waste hemlock bark from paper mill operations for tanning purposes has been further demonstrated in recent tests made by the Forest Products Laboratory, Madison, Wis. The product is satisfactory to the tanner, and can be prepared at a cost that will allow it to compete with leaf bark. The use of paper mill bark for tanning would mean a source of income to the paper mill from a material which is now of little or no value.

INDUSTRIAL NOTES FROM THE UNITED STATES.

America Serving the World with Automobiles.

Washington, D. C., U. S. A., That American exports of automboiles have increased to the point where during the past year one automobile was exported from the United States on the average of every six minutes day and night, Sundays and holidays included, is shown by a detailed study of American automobile exports. The average of time elapsing between shipments of passenger cars was nine minutes, while the average time between shipments of commercial cars was thirty minutes.

These shipments mean that every minute of the day and night $266'28 was spent by foreign purchasers of American automobiles and parts, including engines and tires. Of this amount $48'90 was spent every minute by foreign purchasers of American tires, while $8'93 was spent every minute on magnetos, spark plugs, etc.

In commenting on the growth of American automobile exports, it is pointed out that their total value, including both passenger cars and trucks, amounted during the fiscal year ended on June 30, 1919, to $89,047,000, while exports of parts and tires amounted to $30,121,000.

The total value of automobile exports for the fiscal year ended on June 30, last, was over two and one-half times that of the fiscal year 1914. In the past fiscal year there were fifteen times as many commercial cars exported as in 1913, and their value was twenty-eight times as great.

The number of passenger cars exported during the past year was 45 per cent greater than in 1914, and their value was 80 per cent greater.

The increase in exports of automobile tires is almost as significant as that of automobiles, since the value of these exports during the past year was over six times as great as in 1914.

Some countries spent almost as much during the past year in this country for tires as they did for automobiles. Thus in the case of Argentina, South America, for every dollar spent in the purchase of automobiles eighty-two cents was spent for tires of American make, and for every passenger and commercial car exported to Argentina approximately $1,080 was spent on tires. Incidentally, the value of Argentina's purchases of American-made tires during the past fiscal year was eighty-three times those of 1914.

The value of United States exports of tires to Brazil in the last year was fifty-six times as great as in the year 1914. To Chile, these exports were 108 times those of 1914. Taking the whole of South America, for every dollar spent for American automobiles in the past year 70 cents was spent for tires.

The exports of tires from the United States to British India in the year ended June 30, 1919, were 131 times greater than they were for the year 1914.

A SIMPLE AND INTERESTING METHOD OF WEIGHING AIR.

Finding the weight of air is not only an interesting process, but it requires some very careful work, no matter how or with what apparatus it is attempted.

Perhaps one of the simplest ways in which the amateur can perform this work is by means of a common burnt-out incandescent lamp, with the aid of a fairly sensitive balance. The use of the bulb makes unnecessary a vacuum pump, as it is already exhausted to a high vacuum.

First, weigh the lamp accurately on the balance; then hold it under water and break off the tip by means of a pair of scissors or some other piece of metal. It will immediately fill with water, leaving only a small bubble, which represents the air which was

not exhausted from the bulb. When no more water will flow in, carefully weigh the bulb full of water, being sure to include the tip which was broken off. Now, secondly, shake the water out, and carefully dry the bulb inside and outside. This is best done by warming it. The bulb is then carefully weighed, thus giving the third result.

To find the weight of the water, subtract the third result from the second, and to find the weight of the air which would fill the same volume subtract the first result from the third. It will be understood that these last are the two results which have to be obtained very accurately, since their difference will be small. Dividing the weight of the air by the weight of the water gives the specific gravity of the air, which should come out about ·0013 if the work is done accurately.

It is to be noted that an interesting and instructive question in this connection is as to whether the first result or the third is the true weight of the bulb. Many persons would say unhesitatingly that the first result represented the exact weight of the bulb, since it then contained not even air. From this, it would seem to follow that the third result would be the weight of the bulb, plus that of the air it contains. However, since the bulb can be broken into bits, after the third result has been obtained, and the weighing of the pieces will still give exactly the same result, it is very clear that the third result and not the first is the true weight of the lamp itself. The first result is, in fact, the weight of the lamp less the weight of the air which it would contain if it had not been exhausted. As will be noted, the case is similar to that of a balloon which is only partly filled with gas—the lightness of its interior buoys it up. The effect on the weight of the lamp is, of course, very small; but it is nevertheless a fact that a vacuum lamp will show, on the balance, a somewhat smaller weight than a gas-filled lamp of exactly the same size.

How to Test a Used Automobile.

Besides the general advisability of purchasing a used car—if one buys such a car—from some person in whom the buyer has reason to place confidence, a few simple tests will be of assistance in determining the actual value of a purchase.

Automobilists recognize the fact that no part of a car is more important than the steering gear. Certain small cars have steering systems which are likely to make trouble if badly worn. This is difficult to detect on a smooth road, but will almost certainly show up if the car is driven over a rough road at about six or eight miles an hour. This kind of a test will also cause various rattles and squeaks, made by more or less loose parts, to become noticeable. A bad clutch or a worn transmission can be manipulated by the demonstrator so that a passenger will not notice any trouble. It is, therefore, advisable for the purchaser to drive the car himself and note the action of the clutch and gear shift.

The brakes should be given a good test, both by stopping the car from a fairly high speed, and by braking down a hill.

Also, if it be possible, open the drain plugs of the transmission, and rear axles, and see if any oil or thinned grease runs out. It is often the case that a bad set of gears, or gears with broken teeth, can be made noiseless for a short run by packing the case with heavy grease.

One of the easiest things to ruin on some cars is the storage battery. See that it turns the engine briskly, and that the generator charges it at a proper rate when driving at a moderate speed.

During a driving demonstration the prospective purchaser should listen carefully for loud knocks in the engine and other parts. Worn bearings can frequently be tightened to conceal somewhat the noise they would otherwise make, and certain loose parts can,

by such methods, be made to run quietly and with comparative smoothness for a time.

A prospective purchaser should, above all, avoid an "oil pumper"—that is, an engine whose pistons and rings are worn so that it pumps oil into the combustion chambers, causing most of the misfiring and bad running generally. Such an engine will run smoothly for a while, but after a long drive, if misfiring has occurred, the valves should be examined for oil leakage, which is a strong indication that the pistons and rings are worn.

Some of these tests a novice can undertake; for others he must have an experienced friend with him. The fact of the matter is that the most expert mechanic, unless he has actually seen and felt the entire mechanism of a car, cannot be sure that all parts of it are in good working condition, and this fact makes it very advisable to be extremely careful from whom the car is bought.

Cross-bred Fruits and Grains are Disease-proof.

The United States government's 500-acre experiment farm, just across the Potomac River from Washington, is one of the largest highly specialized farms in the world, and is operated by the Bureau of Plant Industry of the Department of Agriculture.

The latest thing to draw attention to this farm is the announcement, by the scientists working there, that there has been discovered, or rather produced through cross-breeding, a wilt-proof tomato. This is of great importance, because, be it known, there is a mysterious disease called "tomato wilt" which has done untold damage in regions where tomatoes are especially cultivated. The toll from this disease in one state alone last year was 50 per cent of the crop, while other states' crops were cut from 10,000 to 25,000 tons.

At the government farm, however, there was a field of tomatoes which defied every attack by the wilt. The plants in this field were repeatedly subjected to contact with the diseased plants brought from other parts of the country for that purpose, and not one of them was affected in the slightest. From this field, therefore, was gathered a goodly supply of tomato seeds which will be sent to all the principal tomato-growing sections of the country and to other countries. The result, it is confidently predicted, will be the ultimate eradication of the disease and the consequent saving of millions of dollars to the world's tomato growers.

Sometimes the scientists at the experiment farm can find a cure for a plant disease. If they cannot, they seek a plant which will resist the disease, and then, through the mixing of varieties, evolve a seed which will produce bountifully and at the same time be immune to the disease. This was the case with the tomato experiments. Cures were sought for the tomato wilt. This involved a long and exact process, for the wilt germ had first to be isolated and then efforts made to control it by chemical sprays. As these efforts were not successful search was begun for a plant that would resist the disease. After a long time such a plant was found.

This plant, however, yielded but a single scrawny tomato, which had nothing to recommend it but a magnificent constitution. Therefore, it was decided to mate the hardy, but otherwise unprepossessing, tomato to an aristocrat of the same family from another section, noted for its prolific yield. This was done, and after several years of progressive experimenting with the progeny of this, the wilt-proof tomato has been evolved.

Another promising and rather remarkable example of cross-breeding is that of a variety of Siberian wheat with a strain from our own west. The Siberian wheat possessed the quality of superb vigor, built up through centuries of resistance to extreme cold, and the American western wheat that of abundance but the disadvantage to susceptibility to cold. Through this experiment it is expected that there will be evolved a new wheat which will combine the best qualities of both parent wheats.

While all this sounds simple enough, it is in reality a long, tedious and usually costly process. In the case of the two wheats, the expense of mating, including the succeeding tests, has amounted to nearly $ 15,000. Of course, this price will be cheap enough if the final results are as anticipated. The progeny of the Siberian and American wheats is considered so valuable that, during the growing season, it is placed in a cage for protection from birds. This cage is of wire netting, with a head-room of eight feet, so that the cultivator can move about.

Some idea of the huge amount of work carried on at the experiment farm may be gained from the fact that there are over 1,700 different grain seeds alone being experimented with, while the variety of fruits, flowers and vegetables is almost as numerous.

UNITED STATES TO BUILD WORLD'S HIGHEST TOWER.

A monumental tower of steel, more than twice as high as the world's present highest structure, the Eiffel Tower, is to be erected by citizens of the city of Pittsburgh, Pennsylvania, as a memorial to the soldiers of that section who served in the late war.

The total height of the tower, as planned, is 2,100 feet, with an observation platform 100 feet in diameter at the 2,000-foot level, surmounted by four powerful lanterns, indicating by their colors the points of the compass to all aerial navigators within a forty-mile radius.

At the 1,500-foot, 1,000-foot and 500-foot levels, respectively, are a trophy hall, a restaurant and an amusement hall. At the base, a monolithic structure, 100 feet high and 300 feet square, contains free assembly rooms on the ground floor, and a vast convention hall 35 feet above, seating 15,000.

The concrete foundation of the tower goes down sixty feet to bedrock, and in it are embedded the base columns of the tower. The structure, which will, when completed, cost $ 5,000,000, will require about 10,000 tons of steel, and is designed to use only the standard shapes regularly produced in the "steel city." The foundation for this gigantic monolith is now being prepared, and it is expected that the tower will be completed in 1920.

ALFRED T. MARK.

NOTES.

The *Farmer's Journal* gives the following recipe for making soap, which should be found particularly useful at the present time:—7 lb. of groundnut oil, or any fat free from salt; 1 lb. caustic soda; 1 bottle of cold water. The evening previous to the day on which the soap is to be made mix the soda and water in any enamel vessel which has a well-fitting lid, stirring for a few minutes, till the soda is dissolved (beware of the drops squirting up, as the mixture is burning hot and most harmful to hands and clothing). Cover up with a blanket and put into a warm safe place. Next morning warm the oil or fat in a large bucket or pot, until it is quite hot but not boiling, then remove from the fire, and pour the liquid soda or lye into the oil, very gradually and carefully stirring continually for an hour or more until the mixture looks like a stiff cake dough. Even while the mould, which may be any shallow box or tin lined with a damp cloth, is being prepared, the stirring must continue. After it is poured into the mould, smooth the surface, cover over with another damp cloth, then with a thick blanket, and leave for from 12 to 24 hours. When firmly set, turn it out, cut into bars, and return to the cloths and blankets for another eight days. It will now be ready for use and can be put out into the air to harden. The preparation of the soda over-night, the thorough mixing of lye and oil, the conserving of the heat to prevent rapid hardening all combine to make a better and softer soap than would otherwise be the case. If, as occasionally happens, the mixture will not thicken while it is being stirred, put it on the fire and boil for a little while, stirring all the time; then take it off and continue stirring till it has cooled off somewhat. If, on the other hand, it thickens too rapidly and looks crumbly in appearance, put it on

the fire, add a dash of boiling water, and just bring to the boil; stir well, then pour into the mould. The stirring should be done *with a stout stick or bamboo.*

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The Imperial Economic Botanists at Pusa in their report for 1918-19, state:—The work in progress at Quetta on the sun-drying of vegetables has been extended considerably. Towards the end of last year (1918) this product was placed on the market for the first time at Quetta and also at Calcutta. About 1,500 half-pound tins were prepared which found a ready sale. The demand at Quetta was extraordinary. The orders amounted to about 20,000 tins of which only about five per cent could be met. The principal purchasers were the engineering parties engaged on the Nushki Extention Railway and the various regiments operating in Mesopotamia and Persia. An exhibit of Quetta sun-dried vegetables was arranged at the Medical Conversazione at Parel held in connection with the Bombay meeting of the Indian Science Congress. As usual, this attracted the attention of a large number of visitors. It also led to the establishment of an agency in Bombay for the sale of the product. The exhibit was afterwards shown at the Lucknow Flower Show. During the present year (1919), the production of sun-dried vegetables at Quetta has been increased and seven selling agencies in India, in addition to the one at Quetta, have been stocked. The cost of production has been considerably reduced and the work accelerated by the use of power peeling and slicing machines imported from England. These have proved very successful and easy to operate. The preliminary results obtained on the anti-scorbutic and anti-beri beri properties of sun-dried vegetables were communicated by Captain Shorten, I.M.S., Professor of Physiology, Medical College, Calcutta, to the Medical Section of the Indian Science Congress at Bombay. This aspect of the work has since been considerably developed, and it is expected that the experiments will be completed during the present year.

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The Bombay Government reviewing the work of the Registrar of the Co-operative Societies for the official year 1918, point out that failure of the monsoon of 1918 severely tried the resisting capacity of the agriculturists who form the bulk of the members of the co-operative societies. Working of these societies show that agricultural co-operation has achieved a high degree of protection against the vicissitudes of the season and lend further support to the views of the Government formed as a result of the famine relief operation that the people of the Bombay presidency have developed the staying power of the unexpected strength which was evidenced in the loyalty of the depositors to their societies indicated by the comparatively small amount of the withdrawal. In Bombay there is one agricultural society for 12,293 of the population and the average membership is 71 per society, while Madras and the Punjab have only 59 and 22 respectively. Average capital per society is also greatest in Bombay. Amongst the millhands of Bombay good work is being done mainly through the agency of the Debit Redemption Committee and the Social Service League. The resolution concludes paying a tribute to the numerous honorary organizers who helped in the formation of the societies and Mr. Eubank, the Registrar who has devoted himself to the work with enthusiasm and energy for the past eight years.

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Presiding for the last time over the annual meeting of the Board of Agriculture, Sir Claude Hill in the course of a lengthy speech said: One thing was certain that the system under which agriculture had been administered, controlled and stimulated would be radically altered. Agriculture would not only be a provincial subject but would be administered by a Minister. Most of the

major provinces in India would shortly be furnished with well-equipped colleges for higher education and for research in Agriculture. Regarding recruitment, the policy for the future would be to Indianize the Imperial Agriculture service as rapidly as possible having due regard of the maintenance of the high standard of efficiency. Referring to Reforms, Sir Claude said whether it be in the Proclamation of 1858 or in the Proclamation of 20th August, 1917, the goal described was not an accidental and irresponsible utterance resulting from political expediency. It was a pronouncement crystallized in words of developed consciousness of a stage reached in the attainment of the ideal of our race.

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A bulletin issued by the Institute of Science and Industry (Commonwealth of Australia) deals with one of the greatest obstacles to pastoral and agricultural progress in a large portion of the Commonwealth. An area of over 20,000,000 acres is infested with prickly pear in Queensland, and an area of over 2,200,000 acres in New South Wales. The rate of increase of the pest is estimated at 1,000,000 acres per annum. No discrimination is shown in the land attacked. Rich country is as quickly overcome as poor country, and in a short time is rendered unproductive and valueless. The plant is extremely difficult to eradicate, and no satisfactory machine for destroying it has yet been invented. The manufacture from it of alcohol, paper or cardboard, potash, and various other materials has been suggested, but the fact that prickly pear contains a very large percentage of water makes its profitable commercial utilization very unlikely.

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The death is reported of the well-known paddy expert, Baroda Kanta Brahmacharee, late zemindar of Barodi (Dacca) and recently of Margohi (Dehri-on-Sone) where he established a paddy research farm. He renounced his family and zemindary and spent the last fifteen years of his life in agricultural pursuits. He created a sensation at Comilla by demonstrating that the present poor yield paddy *viz.*, ten maunds per bigha, is due to degeneration of the seed and that by Hailey's system of selection the yield could be fourfold. He died on the field of his life-long labour amidst peasants for whose benefit he devoted his declining years.

GLEANINGS.

Mr. (late Sir Titus) Salt, who had been for some years connected with woollen manufacture, happened one day in 1836 to notice at Liverpool some three or four hundred sacks of alpaca wool that had been imported from time to time from South America in the hope of finding a manufacturer who might buy them for some purpose. Several men had tried to work up this new material, but without success, so there it lay for years, no one seeming to want it, till Mr. Salt came across it, and, after a number of trials, in which he modified his wool machinery to suit it; adapting it afresh and overcoming many obstacles he finally solved the problem by adopting cotton warps, and soon after put on the market a new material, alpaca, a soft, glossy, elegant fabric, which so took the fancy of the public that in the course of fifteen years Mr. Salt amassed an enormous fortune which enabled him to carry on the great philanthropical work which made him famous says the *Canadian Textile Journal.*

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Mr. Calvert, the Registrar of Co-operative Societies in the Punjab, says that the following five causes have operated to bring about the indebtedness of the Punjab Peasantry:—(1) The sudden enhancement of credit due to new conditions introduced by the British Government, (2) the abuse of this credit by clever usurers who encouraged borrowing in order to secure control of produce, (3) the famines of 1861, 1869, etc., and heavy mortality amongst cattle which drove the cultivators to borrow and so involved them in the money-lender's clutches, (4) the rigidity of land revenue collection accentuated by the tactics of the usurer who seized the whole produce and so compelled the cultivator to borrow afresh for the state demand, and (5) a system of civil law which

was unsuitable inasmuch as it favoured the clever money-lender against the ignorant peasant.

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A French patent proposes to dye wool and silk black by using, at boil, a bath containing lampblack, burnt sienna, extract of chestnut and acetate of iron. This, at first sight, seems an impracticable combination, writes *Textile World Journal*, since lampblack and sienna are insoluble bodies and so have no penetrative power on either silk or wool. Chestnut extract and the iron compound would yield a blue black. Used in the same bath, however, the colour would be loose and fugitive. Something else not mentioned in the patent may possibly bring about a union of these inharmonious bodies. This, by the way, was a German trick to patent everything except the key to the process.

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In the two cities of Nove Scotia, Halifax and Sydney, shade trees are only permitted to be cut down or trimmed with the consent of and under the supervision of the civil authorities. In the towns and Municipalities of the Province the statute forbids any persons or corporation to cut or mutilate trees upon the highway without his obtaining the consent in writing of the municipality or mayor of the town, and provides a penalty for cutting down or trimming the trees without such consent.

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According to British Patent 126,754, a soluble indigotin dye is prepared by dissolving indigo in sulphuric acid, allowing the mixture to stand for twenty-four hours, adding alum or cream of tartar, if necessary, and heating the mass until fluxed, cooling and neutralising with an alkali. The dye can be mixed with a soluble cudbear extract dye.

There is an interesting article in the April for (1919) number of the *Bulletin of the Imperial Institute* on investigations of some materials suggested for the manufacture of paper supplied from South Africa, Rhodesia, Egypt, Papua and St. Helena. The materials include several kinds of grass and some barks and woods.

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The total annual output of the Canadian Pulp and Paper industry exceeds in value $ 85,000,000. It gives employment to 25,000 individuals. Its annual payroll exceeds $ 15,000,000. It has sent more than 3,000 men to the war.

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The silk factories of the United States are now turning out products valued at approximately $ 500,000,000 a year, against $ 100,000,000 in 1900, and $ 250,000,000 a year at the beginning of the war.

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The newspapers of the United States consume 2,000,000 tons of newsprint every year, of which Canada supplies, approximately one-fourth.

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Great confidence in the future of coconut planting appears to exist, in Trinidad, and coconut planting is being carried by sugar and cocoa planters.

SPEECHES AND PRONOUNCEMENTS.

PATNA UNIVERSITY CONVOCATION

Sir R. N. Mookerjee's Address.

The following is the full text of the address delivered by Sir Rajendra Nath Mookerjee at the annual Convocation of the University of Patna, on the 29th November, 1919, in the presence of His Honour the Lieutenant Governor:—

Your Honour, Mr. Vice Chancellor, Ladies and Gentlemen,—I esteem very highly the privilege and honour which has been conferred upon me by your Chancellor in asking me to deliver the Convocation Address to the Patna University. At the same time I felt considerable diffidence in accepting His Honour's invitation. I have no particular qualification for the part which he has asked me to play in addressing a University Convocation and I feel that I can only have been asked to stand here to-day, not for what he expects me to say but for what I represent. And the only value which attaches to my words must arise from my experience and connection with commerce and industry.

I should like to preface my remarks by offering my hearty congratulations to the recipients of prizes and diplomas and I would beg them to remember that their education does not end with their University career, where they but lay the foundation; the real work of superstructure beginning when their faculties mature with observation and experience of life. I would also impress upon them never to part with the best gift they have received from their University: the inspiration of high ideals.

Gentlemen, the present is essentially a time of reconstruction and reform. The searching test of war brought to light many weaknesses in our political and social system, many gaps in our moral and mental equipment—many defects in our industrial organization, and we are now all considering anxiously how best we can turn to advantage the lessons which we have learnt at such terrible sacrifices. It would be altogether beyond the scope of a Convocation address to deal here with the vast problems of reform which now confront the statesmen of nearly every civilised country in the world. But there is *one consideration* which I propose to place before you in this connection because in my opinion it lies at the root of the whole problem of reform and because I think it is a matter in which this University and other Universities are called upon to play an enormously important part—it is this, that the aim of your University should be to supply young men with an education which will fit them to enter any vocation in life and enable them to occupy their proper place in commerce and industry, which will provide unlimitted opportunities in this province for all for generations to come. Old Universities in Europe have always had close relations with the development of industries. Even as long back as the eighteenth century, Universities materially helped the cause of industries. It was in the University workshop of Glasgow that James Watt evolved the idea of a separate condenser. History tells us that many successful men of business owed their success to the inspiration they received from their professors while at college.

We should no longer be content to give our sons University education which is suitable only for the well-to-do and leisured classes which possess some fixed income. There is only a very limited field for purely literary men and lawyers and only a small fraction of these can attain success. It is essential that those who enter the legal profession should have means to support themselves for the first few years of their career in order to enable them to wait patiently for success. The inadequate development of Indian industry is, in my judgment, attributable to our system of education. But times are fast changing; the world war has created new ideas and has opened up splendid opportunities, which, if not taken advantage of, will pass by. *Here in India* signs are clearly visible that the war has given a fresh and vigorous impetus to the development of our industries and has overcome the shyness of, Indian capital. It is incumbent on us, therefore, to educate our young men in the direction in which the whole civilised world is moving. We must enlarge our system of education, and although it has undoubtedly done great good to the country in the past, yet we can not afford to disregard what other civilised nations are doing. I am sure your University authorities will agree with me that the primary duty of modern University is *to prepare its graduates to be successful and contented citizens.* The war has brought into conspicuous notice the absolute necessity of really efficient and practical education in our Universities in order to produce a good supply of able scientists, engineers, chemists, organizers and administrators to enable us to take our place alongside the great commercial and industrial nations. The rapid progress of scientific discovery in Europe during the war has led to an enormous increase in the application of science in the development of industries and has given a great impetus to the

establishment of scientific research institutes. It is hardly necessary to point out that the great industrial progress of Europe in pre-war days, and especially of the United States and Germany is due to the facilities the Universities of those countries afforded to the people to acquire scientific and technical knowledge. The United States and Germany owed the vast increase in their wealth and rapid industrial expansion to the development of science and scientific research in its practical aspect. Research Institutes with up-to-date laboratories for applied science will cost a considerable sum of money and it will be difficult for the Government of the Province, with its limited resources, to supply the necessary funds within a reasonable time. Private endowment should come to the rescue. Fortunately for your Province you have some enormously wealthy landlords, many of whom could easily afford to endow such institutions with sufficient funds following the illustrous and noble examples of Sir Tark Nath Palit and Sir Rash Behari Ghosh of Bengal and the Great Tatas of Bombay. It is also essential that there should be close co-operation between the University and the great industrial and commercial concerns of the Province, representatives of which should have a voice in the management of the University.

India has led, hitherto, a sheltered political life and if she is to come into her own, she must not be fit to hold her own. She must not be content, as heretofore, merely with eyes to see and brain to reflect on what she sees. She must have feet to march on the path of progress and hands to grasp her opportunities. We need never fear that India will be deficient in culture or in perception, so long as she remembers the history of her own intellectual development, and relies for such studies on her own ancient and glorious literature. I do not ignore but, on the contrary, I give full value to the literary aspect of University life, tradition and training. But the message I have come here to-day to give you, in such imperfect language as I am able to command is that the economic advancement of the people throught out the world will not allow any nation in the future to rest content with making a minimum use of the natural advantages of the country which it inhabits. If that country is not developed by its own children then strangers will inevitably take from them the business and profit of so doing. Equip yourselves therefore for the task of enabling your country to hold its own in this world competition. The country which possesses natural resources and which has scientific specialists to exploit them is bound to have a great advantage over other nations. India possesses natural resources in abundance and Indian Universities should be given necessary equipment to enable them to produce able scientists. The report of the Industrial Commission has indicated the class of men needed and the way in which they can be produced and has, in respect of such matters as Institutions of higher technical training and research, made proposals which the Calcutta University Commission have cordially accepted. I need not go into details here. What I should like to impress upon the governors of the University of Patna is that they have a unique opportunity of assisting in the industrial development of this country by making a special feature of commercial and industrial classes for the purpose of training men qualified to make up an industrial or commercial career on leaving the University.

Your Province is rich in mineral deposits. Coal is by far the most important mineral product, for coal is the main stay of industrial prosperity, and Bihar owns more than half of what the whole of India possesses. Next to coal is iron ore and in your Province lie very extensive deposits the quality of which is not inferior to any found in other parts of the world. The great success of the manufacture of steel organized by the great house of Tata is due to the fact that both good coal and good iron are found in close vicinity to the Works. These two products are of much greater consequence than all other mineral products put together. The existence of extensive coal and iron fields in your Province gives you a much better chance for the development of important industries than any other province in India. The greatest commercial nations of the world to-day are those which have extensive coal and iron deposits. You have so far failed to make use of the natural resources of your Province. Your present system of University education does not enable you to visualise the vast importance and possibilities of the industrial opportunities you possess, or to appreciate the value of the mineral wealth that lies at your feet in this Province. Modern science has succeeded in extracting from coal some of the most precious and some of the most necessary commodities, such as tar, pitch, benzine, napthalene, creosote, dyes sulphate of ammonia, disinfectants and explosives, as well as some of the valuable drugs, such as saccharin, aspirin and many others. There is no reason why within a few years of the establishment of scientific and technological departments of your University some of its passed chemical students should not achieve profitable employment in undertakings which I confidently expect will at no distant date be set on foot to deal with your coal bye-products.

I think I have said enough in trying to convince you and the educational authorities that to keep pace with other parts of the world and to open new fields for the career of our graduates, Government

and your wealthy landlords should join hands and do their utmost to equip your new University with technological and industrial departments, and the undergraduate should seize without loss of time the opportunities which I hope, will soon be given to them by their University.

But I fear that I am importing too much of my own business predispositions into the midst of these cultured surroundings. I am conscious of the fact that in building up certain traits of character nothing can take the place of a University, and, although I attach much importance to the scientific and commercial side of education, still I hold that a University should not be content with this only, disregarding its higher functions. The ideal of a University education is to foster the spirit of discipline, obedience, self-control and humility, to refine the manners and to enrich the intellect, and to impart a high standard of culture and judgment. Above all a graduate should leave his University with the hallmark of gentleman not in the ordinary sense of the world as we generally understand it in our country, but in its highest significance. The best result of a University education in England is manifested in the graduate who is always a gentleman. Good cloths, fine speech and good manners alone do not make a gentleman. A gentleman is he who has a strong character, whose truth is constant and who is honest in his acts, veracious in his speech and one who wins the confidence of all by living a life of perfect integrity. He who lacks in any one of these qualifications that I have stated is unworthy of the distinction and high honour of the University degree which has been bestowed on him.

University education stamps on its alumni a character which is a possession of lifelong value. It is only the harmonious development of all faculties, intellectual, moral and physical, which is cultivated and practised in the University life of the students, that constitutes a perfect University man and this development can be attained by a comprehensive scheme of residential arrangements under careful supervision which will enable its students to come in closer contact with one another than has hitherto been possible to develop that *esprit de corps* which is the foundation of all corporate lives and the source of good and wholesome traditions. The provision of spacious playing fields will promote healthy recreation without which the mind becomes stagnant and character tends to drop.

But let me return once more to the subject which I have most at heart, the need for industrial development.

If the graduates of a University desire to take their places in the world of industry and commerce they must prove their qualifications not only in literary, scientific and technical efficiency but in their strength of character, showing self-reliance, initiative, sense of duty, strong common sense and readiness to assume responsibility.

I hesitate to tread, even for a moment, upon the thorny ground of politics, but on the very eve of the introduction of the Reform Scheme it is difficult to refrain from saying a few words to University graduates and undergraduates on whom the success of future self-government will depend. With the advent of responsible Government, demands will be made upon the moral qualities which hitherto have not been made. The political leaders of the future will be called upon more and more to exercise such qualities as self control, patience, tolerance of the views of those who differ from them, sympathetic understanding of aspirations and ideas which they may not in their own hearts approve. The electors will be called upon to exercise a wise restraint in their use of the note; they will have to cultivate that quality which is half intellectual and half moral judgment. It will be to the Universities, in the first place at any rate, that we shall have to took for the inculcation of these qualities: for it is from the Universities that our political leaders and electors will at first come. I do not agree with those who are of opinion that our post-graduate students should rigidly avoid politics. The political field is the rightful inheritance of the well-educated man. To tell graduates that they are to refrain from all political controversy is in my opinion to create the inevitable desire for forbidden fruit. It seems to my mind far better, in the interest of good government, that the young men in our Universities should study politics and learn to understand properly the politics of the world and particularly of their country, in a properly organized Graduate's Political Society under the supervision of a responsible professor, so that when they leave their University they will be able to direct and confine their political opinions to their proper channels with beneficial results. It requires years of deep study to enable one to form a judgment of and to arrive at the right conclusion in any political problem. Nowhere is superficial knowledge more dangerous than in politics. There can be no objection, I think, to graduates attending political meetings within reasonable limits if their object be to educate themselves in politics and to learn its difficult problems, accustoming themselves to discount at its true value the violent language which in most countries accompanies a political movement. Their education should enable them to carefully weigh all the arguments and to arrive at a conclusion dictated by their own judgment and common sense. They will then be able to adduce intelligent reasons for the opinions they hold and to add weight to the

uninstructed political opinions of the public. I would remind those who wish to follow in the footsteps of men like the late Mr. Gokhale that it is necessary to spend years in studying the knotty problems of politics and to learn to sacrifice personal and private interests to the public good, before it is possible to become a political leader of the country in the true sense of the word.

Gentlemen, I am afraid, I have exhausted your patience and have also disappointed you. I am conscious that my address is full of imperfections and is desultory and discursive, and at times dogmatic. But I also know that your are kindly disposed and indulgent—all University men are indulgent—especially to one, who has not the habit and practice of delivering addresses to such a learned assembly on a subject on which he is profoundly ignorant. I shall feel that I have not wasted your time if I have been able to impress upon the graduates and undergraduates of the University, the necessity for practical technological and scientific education and that henceforth the application of science to industry should be a powerful factor and an established fact and not merely a pious wish.

India is at the parting of the ways; we Indians are throwing of the swaddling clothes which have wrapped us round so long. We are on the eve of momentous changes in the political, social and industrial world. With our feet planted on the ladder of self-Government, admitted as a member of the League of Nations, we can look forward to a bright political future as a sister nation in the British Commonwealth of Nations. We are beginning to throw off restraints and prejudices of caste which have clogged the wheels of progress for years without numbers. We have come to see the importance of developing, to the utmost of our capacity, the illimitable resources in metals and minerals which have lain hidden for so long in the bowels of the earth and we are beginning to recognise the paramount need of providing such a system of education and training as will enable our young men to take the fullest advantage of this enormous potential wealth. The prospect is bright; the omens are auspicious. A unique opportunity lies before the Patna University to play an important part in shaping India's destiny. May she not fail to rise to the height of this great occasion.

CONTROL OF FOODSTUFFS IN INDIA.

The following Resolution of the Government of India in the Department of Revenue and Agriculture (Foodstuffs) on the report on the operations of the Indian Foodstuffs Comissioner, is published. in the *Supplement to the Gazette of India*, dated the 29th November, 1919 :—

In the debate on the resolution moved by the Hon'ble Mr. Chanda, in the Legislative Council on the 15th September last, on the subject of high prices, the Hon'ble Mr. Mant promised that the report of the Indian Foodstuffs Commissioner would be published as soon as possible. The report has now been received and is published[1] for general information.

The Government of India do not think it necessary to comment at length on the report. It deals fully with the various factors which conspired to bring about a grave situation at the end of 1918, and with the measures taken to meet that situation. Some of these measures were very unusual. As pointed out in the report, the Government of India up to the date of the outbreak of the war had always refused to adopt a policy of restricting the export of food-grains from India. The abnormal circumstances created by the war compelled them, in common with the Governments of almost all countries in the civilised world, to resort to an expedient which in ordinary times is open to strong objections. Although the extraordinarily high level of prices still prevailing in India makes it impossible for them at present to remove the embargo on export, they are fully alive to the necessity of allowing, as soon as circumstances permit, the export trade in foodgrains to resume its normal course. A beginning has been made in this direction. It has already been found possible to withdraw either wholly or partially the notifications prohibiting the export of certain foodstuffs, such as ragi, onions, potatoes and chillies. The Government of India have already announced their intension regarding exports of wheat, gram, jowar, bajra, and various other kinds of grain and pulse, and they hope shortly to be able to make a statement on the subject of their rice policy in 1920.

Probably no part of the Government of India's policy during the past year has aroused more criticism than the control exercised over the movements

[1] The text of the Report is published in the *Supplement to the Gazette of India*, dated the 29th November, 1919.

by rail of foodgrains within India. As the report shows, the system of railway priority certificates had its origin in the inability of the railways to perform their normal function of distribution. When the system was first introduced, a large measure of control was deliberately placed in the hands of Local Governments with a view to decentralisation, but it was soon found necessary to exercise central control over inter-provincial movements in order to economise the aggregate food-supplies of the country. The choice lay between two alternative policies. One course would have been to allow no restrictions on the movement between one province and another of foodgrains for which certificates had been issued by Directors of Civil Supplies. This course was considered at the end of 1918 and was rejected. At that time it was feared that India would be in serious straits for food in the middle of 1919, and the danger was, that the available supplies in surplus provinces would be rapidly exhausted by inconsiderate demands from deficit areas. It was decided, therefore, that the wiser plan was to conserve the supplies of wheat, gram and rice in India by regulating export from surplus provinces, and the primary object of appointing the Indian Foodstuffs Commissioner was that he might co-ordinate demands from the different provinces and make an equitable distribution of such supplies as were known te be available. The Government of India were constrained on more than one occasion to override the wishes of particular Governments, but they believe that this report, especially paragraph 53, will show that in all the circumstances of the year the course which they adopted was justified by the interests of India as a whole.

The other important measures taken consisted of the arrangements made for the control, in the interests of India, of the Burma rice trade, and for the importation of Australian wheat. Both these measures were, on the whole, thoroughly successful, and there can be no question as to the advantages derived by India from Mr. Gubbay's ingenious system of controlling not only the distribution of exports of Burma rice, but also the prices at which that rice was sold. The Government of India desire to express their acknowledgments of his valuable services and also of those of Mr. Innes, who successfully carried the scheme through, and whose unfailing tact and resource surmounted innumerable difficulties. The Government of India are pleased to endorse Mr. Innes' commendations of the other officers referred to in the report, and they would be glad if local Governments would suitably acknowledge the services of Provincial Directors of Civil Supplies, whose co-operation with the Food-stuffs Commissioner has enabled the country to get through a most critical period.

ALL-INDIA SCIENTIFIC SERVICES.

A Resolution of the Government of India, Indian Munitions Board (No. M.-440, dated the 26th November, 1919), on the proposal for the creation of an All-India Scientific Services, says :—

The Indian Industrial Commission, in paragraphs 116,118 of their Report, have pointed out that the present arrangements for the recruiting, employment and grouping of scientific officers for the purpose of carrying out research work are unsatisfactory. There have not been wanting, it is true, individual officers who have done valuable work in their own special lines. But some of those who have achieved the greatest degree of success, are also most insistent in their cry for co-ordination, and for the help of other scientists in dealing with the complicated problems that demand solution. The Industrial Commission draw attention, not only to the absence of an effective means for meeting this demand, but also to the entire absence of a scientific atmosphere, except in a few isolated centres. The lack of scientific intercourse and of prospects of material advancement tends to deprive workers of any incentive to research. Unsatisfactory as the existing position is from the point of view of the employed, it is even less satisfactory from that of the employer. The inability of local Governments to judge of the work of the isolated scientific officers whom they employ, or to replace them when they leave or fall ill, has been fully emphasised by the Industrial Commission. The small, but not unimportant, results achieved with the help of the Indian Munitions Board, as an agency for marshalling the scientific forces of the country to attack a few problems of considerable local importance under war conditions, throw into strong contrast the vast field of possibilities from which a consistent policy pursued before the war, might have developed valuable economic assets in peace time and powerful safeguards of established industries in time of war. There have, however, not been wanting examples of attempts, more or less successful, to build up organizations of officers for scientific work ; instances such as the Geological Survey of India and the Indian Agricultural Service, prove by their success, even an their present limited scale, the advantages of system, even though that system differs radically in the case of these two departments. The importance of organizing scientific workers, not only in the interest of the workers themselves, but of the work which they perform and

of the public in whose interest they perform it, is now widely recognised; and the question for consideration appears to the Government of India to be the form of organization best suited for Indian conditions, political, economic and geographical. A scheme for all India services as a basis of scientific organization has been put forward by the Indian Industrial Commission in paragraphs 120-126 of their Report, and supported by the Government of India, subject to certain criticisms of details, in their despatch * No. 15 (Industries), dated the 4th June, 1919. The Government of India have decided to deal, in the first place, with the case of officers employed under Government as chemists; and have, with the concurrence of the Secretary of State, appointed a Committee, with the following terms of reference:—(1) To consider whether an all-India Chemical Service is the best and most suitable method of overcoming the difficulties and deficiencies pointed out by the Indian Industrial Commission. (2) In the event of the Committee approving the principle of an all-India Service, to devise terms of recruitment, employment and organization; to indicate the extent to which chemists already in Government employ should be included in that service; and to suggest what should be the relations of the proposed organization with the public and with departments of the Government of India and of local Governments. (3) In particular, to frame proposals for the location, scope and organization of institutions for chemical research. Professor J. F. Thorpe, C.B.E., D.Sc., Ph.D., F.I.C., F.R.S., Professor of Organic Chemistry in the Imperial College of Science and Technology, London, has been appointed President, and Dr. J. L. Simonsen, F.I.C., F.A.S.B., Forest Chemist, Dehra Dun, has been appointed Member and Secretary. The constitution of the Committee will be announced shortly.

* Paragraphs 22 to 30 of the despatch are published in the *Supplement to the Gazette of India* of the 29th November, 1919.

TOPICS FROM ECONOMIC PERIODICALS.

SUGAR PRODUCTION IN INDIA.

Facts and Fancies.

Dr. C. A. Barber, C.I.E., Sugar-cane Expert to the Government of India, writes to the *Times* (Trade Supplement):—

The character of the Indian sugar industry is peculiar and complicated by many special features, and there appears to be a great deal of misconception in this country as to its possibilities and limitations.

It must be noted, at the outset, that the varieties grown are so different form those in the tropics that they practically form a different species of plant, and the produce obtained from the fields is neither sugar nor a substance from which, as raw material, sugar can be economically manufactured. It has become the custom in recent years, presumably from a desire for completeness of survey, to include the Indian indigenous industry in the world's totals of sugar production and export, and this has not infrequently led to invidious comparisons between the sugar methods of the British Empire and those of other countries, whether in the exploitation of the sugar-cane or beet-root. The huge endemic cane-growing of the natives of China, Central Africa, South America, and the Pacific Islands are not added, presumably for lack of details, but the Indian figures, as will be shown later, have as little to do with the world's markets as have those of the Celestial Empire. Thanks to the magnificent work of the Indian revenue officials, figures of crop acreages and yields are available in almost superabundant detail, and these, coupled with a skilful handling by the Director of Statistics, have been eagerly seized upon by the trade journals, without discrimination as to their relevance.

USELESS FIGURES.

It is the claim of the writer that, with the exception of the small quantity of sugar produced in Indian factories and the large quantity imported into the country, the Indian figures should be dropped, at any rate until such time as similar figures are available for the inclusion of the crude production of other countries. To the ordinary reader it certainly seems anomalous that India, with an acreage under "sugar-cane" greater than all the rest of the countries under report, should yet find it necessary to import many hundreds of thousands of tons of sugar from Mauritius or Java every year to supply its

needs; and the fact that India does not produce sugar would come as a surprise to such a reader. And when such a usually well-informed writer as the editor of *Tropical Life* points to India as the obvious source from which increased quantities of Empire grown sugar can be expected, if only rational methods are adopted, in that it should be a comparatively easy matter for that country to double its yield per acre, it is time that an authoritative account should be given of the possibilities of the case. It is a fact worthy of consideration that, while such ideas seem to prevail among the bulk of English writers on the subject, every worker in India takes a different view, and regards the possibility of India ever becoming a sugar-exporting country as extremely doubtful.

The Indian Government, never a very efficient publicist, is fully alive to the necessity of improving the local industry, and has paid great attention to it during recent years. Among the latest steps taken have been the formation of a permanent "Sugar-Bureau," whose first duty is to collect into one office, arrange, and sift the enormous mass of information which has accumulated as the result of the work of specialists during the past thirty or forty years, and the appointment of a strong committee, under the chairmanship of Mr. Jas. Mackenna, the Agricultural Adviser to the Government of India, which will assemble in October.

The accompanying map gives a birds'-eye view of the relative proportions in which sugar-cane is grown in the various Provinces (not published in this *Journal. Ed., M. E. J.*) A convention has been introduced by which each on the map represents 10,000 acres under cane. The decimal figures give the proportional yield of gur, as compared with the average production for the whole of India, namely, 2,719lb. per acre. The figures, both for acreage and yield, being averages for a series of years ending with 1918, have been extracted from the latest reports of the Director of Statistics, and may be taken as substantially correct. The main sugar tract of India, it is at once seen, is confined to a broad strip of country along the southern margin of the Himalayan Mountains, and comprises the United Provinces and parts of the Punjab, Bihar, and Bengal. The area under sugar-cane in this tract, most of it well outside the tropics, averaged during the last five years 2,197,380 acres, while tropical India had only 292,520 acres under cane.

SPECIAL TYPES OF CANES.

It has been found, after many years of experiment, that, while excellent sugar-canes of the same type as those grown in the West in Indies, Mauritius, and Java can be grown in Madras and Bombay, and, to a less degree, in Bengal, Assam, and Burma, they cannot be got to a millable condition in the United Provinces and the Punjab. In these latter provinces, in Bihar and most of Bengal, their place is taken by altogether different types of canes, growing nowhere else in the world (excepting one form in Natal), so different from the sugar-cane of the tropics that one is tempted to regard them as the descendants of an altogether different wild parent. These sugar-canes, which occur in the greatest variety (130 have been collected thus far at the Coimbatore Cane-Breeding Station), are indigenous in India, that is orginated there, while it is probable that the true sugar-cane arose from a different ancestor in Malaya or the Pacific Islands. The Indian canes are much smaller in every way, frequently hardly thicker than a stylographic pen; they have a hard rind, much fibre, and little juice; they tiller enormously, 50 canes often arising from one rootstock, are very hardy and, to a certain extent, frost resistant. They cannot stand generous cultivation, and a comparatively light addition of manure hinders the formation of sugar in the tissues. Under the most favourable conditions they do not usually produce a couple of tons of gur per acre, and often (in the Punjab, for instance) they do not produce much more than a quarter of this quantity. They have, however, this in their favour, that they are the only class of cane which can mature at all in the peculiar climatic conditions of the tract, and they appear to be excellently adapted to these conditions.

A very cursory knowledge of the climate of North India would convince any sugar-cane planter of the impossibility of growing thick, tropical canes for factory purposes. During the "cold whether" (November to March) there is little rain, and the temperature is very low, with occasional frosts. The cane sets are planted towards the end of this period, and take a month or even six weeks to germinate and appear above ground. The young shoots are met by the "hot whether." During April, May, and June the temperature rises steadily, until it far exceeds that in Bombay and Madras and the tropics generally. The air is excessively dry, and the canes, in spite of irrigation, lead a struggling existence. With the arrival of the monsoon, all is changed. During "the rains" large tracts of country become soaked with moisture, if not water-logged, while the temperature, although falling considerably, remains high. It has been said that the sugar-cane thrives best where the white man cannot live, and that accurately describes the state of the atmosphere. If drainage is efficient, the conditions are ideal for rapid plant growth, and the young cane plants readily respond and shoot up with amazing vigour. But these ideal conditions do not last long. The

rains gradually lessen, and towards the end of October the temperature has fallen so low that growth practically ceases and the cold whether sets in. The total period of the growth of the cane above ground may be taken as about six months, and in only four of these are the conditions at all suitable for thick canes. What variety from the tropics would have a chance of maturing in these circumstances?

INDIA'S LIMITATIONS.

This bare statement of facts will, it is thought, bear out the contention that the "sugar industry" of India is peculiar and complicated by many special features, and the comparatively low yield of slightly over a ton of sugar to the acre should not be thrown in the face of the Empire sugar-makers. To alter the practice of centuries is no easy matter. It is, furthermore, the settled policy of the British Government to allow the utmost freedom to subject races, as regards local customs, which is compatible with good government. We cannot for a moment consider the introduction, whether in India or Nigeria, of such measures as the Japanese have used to build up the sugar industry of Formosa, or even the modified State control which has been adopted by the Dutch in Java. What, then, is Government doing to improve the sugar industry in India? This is a large question, and its full answer would traverse the steady work of many officials during the past quarter of a century, if not much longer. Briefly, the chief lines of study are (1) the improvement of the class of canes; (2) the introduction of more careful treatment of the canes in the fields; (3) the improvement of the methods of manufacture. Much progress has been made in the past in all these directions, and there is no sign or the efforts of the agricultural officers slackening—rather the reverse. The introduction of sugar factories is quite another matter, but it also is receiving very special attention, for there are, especially in Assam, Bombay, and Burma, still large tracts of country which are unoccupied, and which have been proved to be capable of giving good crops of factory canes. But each of these areas has its special difficulties—labour, transport, water, malaria, land rights, capital, etc.—and cannot be dealt with briefly. Suffice it to say, in conclusion, that in the opinion of the writer, there is no immediate prospect of India's contributing to the world's sugar supply, if indeed she succeeds in producing

EDUCATION IN ENGLAND.

Sir Michael Sadler writes in *Indian Education* :—

One of the most interesting conferences at which education is discussed is that of the society for New Ideals in Education. This society is an influential body and will hold its next meeting at Cambridge at the end of the present month. It has taken as the subject of its conference, "The Creative Impulse and Its Place in Education." Lord Lytton will preside at the opening meeting, and the inaugural address is to be deliverd by the President of the Arts and Crafts Exhibition Society. On the following day, under Lord Haldane's presidency, Dr. A. J. Brock will speak on "The Effect of Handicraft on Mind and Body," and Mr. William Rothenstein, the painter whose works have opened many Western eyes to the beauties of India, will speak on "Drawing and the Imaginative Side of Education." On the following day, the conference will discuss the position of the craftsman in relation to education and industry. Other topics which come under review are nationality in music; the educational value of the artistic crafts; needle craft and weaving and their place in education. At the closing meeting of the conference, Sir Frank Benson and Mr. John Drinkwater will speak on the training of the dramatic instinct.

This programme illustrates a new trend in educational thought in England. Those who sympathise with it believe that the work of pupils in schools and colleges should not be merely passive and assimilative. The power of self-expression through imaginative and original work should be stimulated and encouraged. Especially should this be done through the Practice of the arts. The reason for this is twofold. First, the love of beautiful things has great power over disposition and temperament. Secondly, the standard of excellence in every branch of creative art is so high as to inspire respect and admiration on the part of all who attempt to practise it. Art, using the word in its widest sense, has this double function in education. It trains the imaginative and creative powers; and it sets up an exacting standard of achievement. Under the inspiring leadership of a gifted teacher, the pupil becomes, as it were, an apprentice to the practice, of an art. His life is enriched by a new ideal of beauty. At the same time, he is brought face to face with an exacting standard of excellence, which forbids self satisfaction.

There is significance in the steady growth of this

west. It is revolt against unnecessary ugliness in life and against the waste of beauty through indifference and heedless stupidity. It is an essential part of the new aspirations which are leavening the thoughts of labour. It is a protest against a one-sided insistence upon money value as the standard of what is pre-eminently useful and important. It is a sign of a change in human values, a preparation for the re-adjustment of mind and heart to a new way of life and to a new conception of the meaning of wealth. It is a presage of economic change. Educational thought and experiment give us clues to the future. They enable us to foresee what is coming. The outlook in Europe at the present time is revolutionary. No one can predict the course of the storm which is likely to break out against the existing economic order. But among the forces with which the West will have to reckon is an intense desire for greater freedom in the development of personality and for the fuller satisfaction of the instinct for beauty and self-realisation in the conduct of life. Those who wish to encourage the creative impulse in education are sensitive to this new movement in human thought and wish to guide it, by stimulus and by exacting discipline, to the choice of what is good and to the achievement of beauty in the lives of men and women and in the surroundings amid which they live.

As an example of what may be done in schools to combine exact training in language and literature with the practice of the arts, I will attempt to describe a remarkable performance by the children of the Hall School, Weybridge, on July 3 and 4. The Head Mistress, Miss Gilpin, with the assistance of expert helpers, had arranged for dramatic representation of a French story dating from the thirteenth century. It is called *Amis and Amiles*. It is the story of a great friendship. Two boys, Amis and Amiles, were taken, when children, to be baptised by the Pope in Rome. To each he gave a golden bowl, charging them to live with courage, courtesy and compassion and bidding them, if either should be in need, to seek the other's help. They were to be known to each other by the possession of the golden bowls. The boys were so much alike that they could not be known apart. This likeness made it possible for Amis to personate Amiles at a moment of great danger and to save his life. But Amis fell ill of leprosy. Borne upon a litter, he discovered himself to Amiles by the disclosure of the bowl. Amiles received Amis into his castle and tended him there. In the night, Amis saw a vision in which an angel told him that, for his cure, Amiles must kill his own two children and that this message must be given to Amiles by Amis himself. Amiles made the sacrifice. Amis was restored from his leprosy, Amiles went to weep over his dead children, but found them singing and playing in bed. The two friends, who knew at what price the leprosy had been cured, rejoiced together over the happy ending. Such is the outline of the tale, which is found, under different names, in countries both East and West. Miss Gilpin had retained the old French, modernising the language when necessary, but adding nothing to it. Children, acting as a chorus, told in turn the narrative part of the story. The rest lent itself without change to dramatic representation.

Those whose good fortune it was to be present were moved by the beauty of what they saw and heard and by the significance of it. The enunciation and pronounciation of the children were perfect; the singing beautiful; the disposition of the stage and of the performers, exquisite. The children, under guidance, had made the banners and other properties which were used in the play. Dalcroze eurhythmics were used to represent troops of riders and the combatants at a tournament with an excited crowd. The music itself was drawn, as far as possible, from sources contemporary with the old French story. The colour and design of the scenes were adapted from illuminated missals of the thirteenth century. And yet, though accurate in point of scholarship, the play was full of the modern spirit. In preparing themselves for its performance, the children had expressed themselves. They had also undergone a severe discipline in learning the French, in mastering its meaning and pronounciation, in the study of the music, in the design and execution of the properties, and in perfecting themselves in the rhythmic movements required. The ages of the children ranged from 7 to about 14. Fifty took part in the play. The preparation of it had occupied most of their time for about two months.

The large company which witnessed the performance included many painters, musicians and education officials, as well as the parents and friends of the children. Those who were present realised that they were seeing one of the most beautiful things in the world.

Such work as this can only be done under conditions of educational freedom. The Hall School, Weybridge, is under inspection by the Board of Education. But, as it is a school for young children, its course of study and training can be adapted, according to the discretion of the Head Mistress to the needs of the children under her care. She brings to her work a genius for the devising of new methods of education. With the help of fellow-workers, she secures a very high level of excellence, both on the artistic and the more strictly educational side. The same educational spirit and the same

exacting standard in scholarship and design will be fruitful in other spheres of education, if opportunity is given. In the organization of the school system of the country, we should avoid anything which sets up a tyranny of examinations and shackles the freedom of teachers who are competent to use liberty to the advantage of their pupils.

SIGNS OF CHANGE IN GERMAN EDUCATION.

The influence, both direct and indirect, of German upon English educational ideas is so strong, partly because of the texture of European life, partly because of the skill with which the Germans have developed certain aspects of education, that changes which have taken place during the last two years in the educational outlook in Prussia indicate the force of some tendencies which are not unlikely to show themselves in English education policy. Mr. I. L. Kandel has written an interesting essay upon the new spirit in Prussian education during the last year of the war. The democratic movement has challenged the autocracy in regard to educational policy as in other fields of national endeavour. Since the overthrow of the monarchy, the Prussian Education Department has issued new rules for the governance of schools and universities. It is decreed that the teaching of history and other subjects must no longer be used to arouse national hatreds. All books which glorify war are to be removed from school libraries. Teachers are forbidden to make any remarks which would debase the achievements of the social revolution in Germany in the eyes of their pupils. They are enjoined to say nothing which might excite sympathy with a counter-revolution and endanger the democratic Government by the possibility of civil war. In other words, the schools are to become the allies of social democracy. In former days, the autocracy used the schools (so far as schools can be used) as barriers against the spread of social democractic opinion. Under the new condition, the schools are to be used in the defence of social democracy and as an escarpment against reaction.

Religion has ceased to be an examination subject. No teacher may in future be compelled to give religious instruction. Teachers who have been punished for their political or religious convictions are to be reinstated. A Socialist teacher has been appointed principal adviser to the Ministry of Education. Eminent representatives of scientific socialism are to be appointed to University Chairs.

The leaving examination from the higher secondary schools is to be transformed and the number of examinations reduced. Physical training is to be no longer of a military type. Larger powers of self-government have been given to teachers and pupils. Co-education has been introduced in some schools. The way is being prepared for the introduction of unsectarian moral teaching. In other words, organized democracy is using bureaucratic control for the establishment of school system consonant with its principles and in harmony with its own spirit.

It is perhaps inevitable that one extreme policy should follow another by the swing of the political pendulum. For its over-organization in the interests of one party, Prussia seems likely now to pay the penalty of over-organization in an opposite direction In the Prussian educational system foreshadowed by the new decrees, there is little hope for that variety of effort and liberty of self-expression which alone can reflect the different aspects of a many-sided national life and hold out hopes for a peaceful and stable development of national institutions.

LIBRARIES AND LIBRARIANS.

The "Daily Telegraph" writes:—

There can be no surer sign of a settled and developing civilisation than the foundation of libraries, nor is there any department of human interest in which the advance has been more scientific and thorough. We observe that the School of Librarianship recently instituted by the University of London at University College is shortly to begin its labours, after being formally opened by Sir Frederick Kenyon. A mere list of the appointments in the staff of the school shows how many different topics of the highest intellectual significance can be ranged under the general head of Librarianship. There is bibliography; the problem of cataloguing; classification and all that obscure subject involves; library organization, a vague term covering a great deal of methodical routine; literary history; selection of books; public library law; palæography and archives. A librarian nowadays is by no means an average individual known to be fond of books and therefore to be entrusted with their collection. He must know a great deal of science and a great deal of history; he must have studied ancient manuscripts; he must be well read in the classics and in modern languages, he must have a quick intutive discernment as to the value of old documents, as well as a large acquaintance with works, both ancient and modern, belonging to pure literature. The first foundation of a library implies a civilisation that is conscious of itself, and therefore anxious to remember its own history. Naturally enough, the first use to which the invention of written symbols was applied was the regard of important religious and politcal transactions. These records, valuable to the State, would be preserved in sacred places, from which it would follow that the earliest libraries of the world were

probably temples and the earliest librarians priests. In point of fact, priests were the only persons who could perform such work as the compilation of annuals, and until the extension of the arts of writing and reading they alone possessed the necessary knowledge. Collections of archives were, undoubtedly, the first form of libraries. The Medes had collections of this kind at Ecbatana, the Persians also at Susa; and to these must be added the archives at Knossos discovered by Sir Arthur Evans of a date synchronising with the 12th Egyptian dynasty, more than two thousand years before the Christian era. Much later in point of time would come the collection of works of literature proper. Ballads, songs, and poems of every kind were conveyed orally from one generation to another long after the record of important events in which the State was concerned was regularly committed to writing.

Thus out of the mists of an almost legendary age comes down to us that unfailing instinct of culture which leads to the formation of a library. We have referred to the Medes and Persians, and to that wonderful Maritime Empire which had its home in Crete. But more important and more interesting is the case of Assyria. We owe to the persistent activity of Sir Henry Layard the discovery that in Nineveh there was an extensive library. In the course of his excavations more than half a century ago Layard came upon some closets or chambers in the place, the floor of which was covered a foot deep with tablets of clay. On these were written what are known as cuniform inscriptions, in many cases so small as to require a magnifying glass, the tablet varying in size from one inch to twelve inches square. There is no doubt what these were. They formed the library of the great Monarch whom the Greeks called Sardanapalus, and who is otherwise known as Assur-bani-pal. From this marvellous specimen of ancient culture it is but a step in the world's history to pass to the great libraries of Alexandria, which were the most important, as they were undoubtedly the most celebrated, in the ancient world. The story goes that Aristotle was one of earliest scholars in Greece to collect a library, and that it was be who communicated the taste for collecting to the Sovereigns of Egypt. At all events, under the enlightened rule of the Ptolemies a number of scholars and men of science were attracted to the capital, and found the materials for their industry in the libraries collected by such Monarchs as Ptolemy Soter and Ptolemy Philadelphus. Indeed, Ptolemy Euergetes, who succeeded Philadelphus had the rapacious habit of seizing all books brought into Egypt by foreigners for the benefit of his library, the owners being forced to be content with mere copies in exchange. It is somewhat doubtful how large the libraries—for there were two in Alexandria—were at the time of their greatest prosperity. According to tradition there were at least 400,000 and, perhaps, as many as 700,000 volumes. On the other hand, it must be remembered that the ancient book consisted of a roll containing a much smaller quantity of matter than a modern book. Herodotus's famous history, which we can easily get into two volumes, even with ample commentaries, originally consisted of nine "books" or, in other words, nine rolls. Homer's Iliad would extend to twenty-four, so that, in comparison with modern libraries, the total number is not so great as at first sight it appears. But the libraries at Alexandria enjoyed no good fortune. When Cæsar set fire to the fleet in the harbour of Alexandria the larger of the two libraries accidently caught the flames and was destroyed. Antony, amongst other of his opulent gifts to Cleopatra, repaired the loss by presenting to his Queen the library from Pergamum, whose kings vied with the Egyptian rulers in their encouragement of literature. Henceforward the collection of volumes flourished until, according to the ordinary account, the conquest of Alexandria by the Saracens in 640 A. D. brought with it utter ruin. But it is unlikely that much remained for the Saracens to destroy, for there had been years of disorder and unsettlement, when literature and science had fallen into such neglect that it seems only too probable that a multitude of books would be sacrificed in the general anarchy.

We have lingered over ancient records because it is always interesting to trace the gradual rise and development of so great an industry as the collection of books. To give a library to a town was one of Carnegie's great ambitions, but his efforts were not always marked with the success that they deserved. In public libraries, however, this country is remarkably rich. The British Museum ranks in importance before all the great libraries of the world and perhaps excels them in the arrangement of its contents. Over five million items of various sorts, including not only printed volumes and MSS. but also pamphlets, are comprised in the collection. Especially valuable and important amongst many other possessions which make it famous is the department of MSS. in the British Museum. It ranges from the third century B.C. down to our own times. The old historical chronicles of England, the charters of Anglo-Saxon Kings, and the celebrated series of Arthurian romances are well represented here. So, too, owing to the famous collections made by Sir Robert Cotton and Robert Harley, Earl of Oxford, the Museum is the coveted possessor of Early Anglo-Saxon documents and Latin codices; while the Burney collection of classical MSS. has furnished important additions, the Museum being able to boast of an early copy of the Iliad and one of the earliest known codices of the Odyssey. But we have not the space to allude to all the treasures to be found in the celebrated edifice in Bloomsbury. Nor, indeed, can we do more than refer to the two other collections which can be compared with the British Museum, namely the Bodleian Library at Oxford and the University Library at Cambridge. Every pupil of the Alma mater is proud of the Bodleian Library, and is only sorry that more space cannot be found for storing in available fashion its priceless treasures. It is one thing, however, to possess these treasures, and it is quite another to make them generally useful. Here is where the science of librarianship comes in, especially in the formation of catalogues, which, unless they are arranged on thoroughly scientific lines, are apt to encumber and perplex the student by the very fulness of their references. It is relatively easy, of course, for so well-managed an institution as the London Library to make its books easily available, but when, instead of some 250,000 volumes—this is what the London Library possessed a few years ago—we have to deal with three or four millions,—the work of arranging and cataloguing becomes a stupendous task. It is for its zealous co-operation in discharging this and other duties that we wish all success to the School of Librarianship recently instituted by the University of London.

ECONOMIC NOTES.

INDUSTRIES AND COMMERCE.

The Ranade Industrial and Economic Institute.

We take the following from the Report of the Ranade Industrial and Economic Institute, Poona, for 1918-19 :—

After an experience extended over nearly six years of active work, it has now been decided by the Governing Board, that the Institute should undertake to work on problems regarding the development of Indian raw materials. In their resolution passed on the 7th of March 1918, the Governing Board say that "The primary purpose of the Techno-Chemical Laboratory of the Institute is the investigation of the development of Indian raw materials, the methods for whose utilization are not known or have not been worked out. When a proposed process has been worked out elsewhere, the applicant should be referred to the sources of information available. If there is any question, information on which is unavailable, in the attempt to establish the industry, the Laboratory of the Institute will be at the service of the applicant, as far as room is available and the Institute will be prepared even to engage special staff, for the purpose of investigation, provided the cost of such investigation and such staff be paid for by the applicant concerned."

In conformity with this resolution Mr. Limaye has been working during the period under report, on oils, especially the Neem Oil. About ten oil seeds which have not been sufficiently investigated, were collected, in the light of information available in published literature and it was decided to investigate thoroughly the oil from the seeds of Melia Azadirachta, Linn, since these were easily available in the neighbourhood.

Part of Mr. Limaye's time was taken up by the investigation of a low grade graphite from Central Provinces, in order to ascertain whether it could be purified so as to increase the percentage of graphite. He was able to push the percentage of graphite from about 13 to 36. As is well known such impure graphite cannot be used industrially unless the percentage in the final product is increased to at least 75.

Messrs. Kirloskar Bros. of Kirloskarwadi applied for some technical help regarding the distillation of wood. Mr. Limaye visited their factory and after showed them how to separate the primary products of wood distillation.

During the period under report nearly forty different samples were received from the public and were reported upon to the satisfaction of the senders.

Mr. R. R. Deo, B. Sc., who was working on "Kumbha" fruit in the Laboratory for nearly a year as a chemist of the Ichalkaranji State left in July in order to specialize further in applied chemistry in the Indian Institute of Science, Bangalore.

JAPAN'S FOREIGN TRADE.

In a period of twenty-five years, during which she has fought three successful wars, Japan has increased her trade by more than 2,000 per cent says the *Board of Trade Journal.* The amount of bills which passed through the Clearing Houses throughout the country from February, 1918, to February, 1919, shows an increase of 432 per cent, *i.e.*, yen 57,135,758,093, as compared with yen 10,725,252,142 in the same period of 1917-18.

The following are the comparative figures of Japan's foreign trade for the first six months of 1918 and 1919 :—

	Jan.-June. (Value in yen approx.) 1918	1919
Total Exports ...	806,400,000	743,400,000
Total Imports ...	755,100,000	944,100,000

The monthly average value of merchandise exported (domestic produce) during the following years (values expressed in £ 1,000 sterling—currency converted at approximately par rates), has been :—

1913 ...	5,355	1918 ...	16,427
1914 ...	4,992	1918 January ...	11,932
1915 ...	5,954	February ...	12,690
1916 ...	9,500	March ...	13,399
1917 ...	13,479	April ...	14,373

Similarly, the monthly average of imports of merchandise for home consumption only has been :—

1913 ...	6,173	1918 ...	13,855
1914 ...	5,021	1919—January ...	13,993
1915 ...	4,435	February ...	17,229
1916 ...	6,331	March ...	17,041
1917 ...	8,604	April ...	21,010

In spite of the set-back due to the cessation of demand and hesitation and caution among buyers abroad owing to the fluctuation of prices, Japan's trade is in a fairly wholesome condition, though the end of the year is bound to see a steadily increasing adverse balance of trade. For example, Japan's exports to the United Kingdom in the first six months of 1919 are valued at 44,667,014 yen, against 69,537,212 for the last six mouths of 1918. On the other hand her imports from the United Kingdom were valued at 49,252,879 yen for January-June, 1919, against 32,756,387 for July-December, 1918. The demand at home, however, is on the increase, and there are encouraging prospects.

TRADE WITH CHINA.

Ten years ago the total value of Japan's imports from and exports to China only exceeded Great Britain's total by taels 4,000,000. To-day, Japan's trade with China equals that of the whole British Empire, including Hongkong, and if her share in Hongkong's trade were correctly ascertained it would undoubtedly be found to exceed the British Empire's total by a very considerable amount. It is not considered, however, that Japan can maintain this predominance, which is largely due to the trade disabilities and restrictions imposed by the war on all European countries and the United States of America, of which she naturally took every advantage. Her trade with Hongkong showed a decline in the first half of this year.

	1916. Hk. Tls.	1917. Hk. Tls.	1918. Hk. Tls.
Exports to China ...	160,490,720	221,616,891	238,858,578
Imports from China ...	112,922,258	105,773,819	163,394,092

The Shantung Peninsula dispute between China and Japan has been having its effect in trading circles. A boycott against Japanese goods over the Shantung question has put new life into various markets, Chinese dealers having set aside, and in many cases destroyed, their Japanese stocks at great loss. Orders for lines previously obtained from Japan are being freely placed with other countries in spite of higher prices. The opinion is expressed that even on the settlement of the trouble a majority of the dealers will not return to Japanese goods. Some of the largest Chinese dealers and importers have resolved to set aside all the Japanese cargoes which they have held, and have given their customers assurances that Japanese goods will not be stocked in future. It must be noted, however, that in the period January-June last, Japanese exports to Kwantung nearly doubled to 63½ million yen, compared with the previous half-year.

TRADE WITH GERMANY.

In July a large number of Japanese industrials, merchants and journalists left for Germany. They had large orders to place from their principals. The object of their visit is to ascertain whether the German market is capable of absorbing Japanese wares, and whether an exchange of articles would be feasible, more particularly machinery. Japan wishes especially to capture the trade in Netherland, East Indies, Siam, China and the Straits, formerly in German hands, by means of German goods, which she intends taking in her own ships as return freight. But as, meanwhile, the Japanese banks are not prepared to extend credit, the matter must remain a question of barter only.

Japan also proposes that Germany should compete with Great Britain and America in supplying her machinery requirements. For example, in the Wuppertal Textile Machinery industry, all kinds of the most essential textile machines are constructed, not only power-driven iron weaving looms, but all the other large and small machines used in weaving, also the various machines necessary for dyeing, printing and finishing works. Japan is greatly in need of machines for cotton spinning and weaving: Hitherto Great Britain has supplied the Japanese market, but at present seems unable to meet the demand. America has made every attempt to secure the market, but prices prove a stumbling block. German exporters will compete for Japanese orders.

TRADE WITH BRITISH INDIA.

During the war Japan's trade with India showed very great development. In 1917-18, the total value was more than £30,000,000, an increase of 103 per cent in imports and 400 per cent in exports over the pre-war average.

The figures for the official year 1918-19, show that Japanese exports to India during that period reached a total of £22,333,333, which was practically equivalent to one-fifth of India's total import trade.

It is not so generally appreciated what an important part Japanese houses established in India play in the trade carried on between India and countries other than Japan. The census of 1911 showed that there were at that time only 32 male Japanese in India, excluding Burma. There are now large Japanese colonies in Calcutta and Bombay, which appear to be steadily growing in numbers and importance. There are now three Japanese exchange banks in India, whereas three years ago there was only one.

Ten years ago the greater part of the Japanese imports into India were carried in British ships,

financed by British banks, and distributed by British or Indian traders. Now, however, 90 per cent of these goods come in Japanese steamers. They are, to a large extent, consigned to Japanese firms, and the trade is mainly financed and distributed by Japanese nationals. Similar conditions obtained in the export trade. The Japanese Cotton Spinners Association practically dominates the market for raw cotton, and Japanese buyers are found in the cotton markets in the rural areas. In many cases they gin and bale their own purchases.

At present Japan's total trade with India exceeds that of all other countries except the United Kingdom, but there are strong probabilities that the figures for next years will show a substantial decline. From many quarters come reports of a growing dissatisfaction with Japanese goods on the part of the Indian consumer.

The increase in Indian trade with Persia between the years 1914 and 1918 (krans 149,000,000, or £6,500,000) consisted principally in cotton and woollen textiles, iron goods, rice, cereals, indigo, etc. It is, however, certain that though the goods were stated in the main to be of Anglo-Indian origin, they were in reality of Japanese origin, and passed through British India before being re-exported to Persia.

TRADE WITH NORTH AMERICA.

The needs of Japan of iron, chemicals and other goods have caused a great change in her commercial position with North America. Her exports in January-June, 1919, showed a shrinkage in value of yen 3,493,575, at yen 263,138,795, but her imports extended to yen 412,498,342, from yen 348,632,370 in the first six months of last year. The balance of trade in favour of the United States was yen 154,783,871 with Japanese imports from there increasing to yen 408,910,586. Trade with Canada fell off in both exports and imports to yen 7,482,962 against yen 11,021,506 and yen 2,686,795 against yen 3,566,339 in the respective half year.

TRADE WITH LATIN AMERICA.

A great increase has taken place during recent years, and especially since the outbreak of the war, in the trade of Japan and various South American States, and in nearly every case Germany has been the loser by it.

The upward tendency of Japanese trade with South American markets is well maintained up to the present so far as the export trade was concerned—her exports being valued at 11,430,152 yen for the January-June period against 8,669,782 yen for January-June, 1918, and 2,616,631 yen for the same period of 1917.

The general consensus of opinion in South America is that while Japanese factory prices are well below those of the United States and Great Britain, freights are very high. Local importers state that the general tendency of Japanese exporters was at first to require payment in advance in yen. In some cases confirmed bank credits in port of shipment have been required. Credit policies appear, however, to have grown more liberal, and many firms are now dealing on a sight-draft basis. Recently a Japanese export house quoted goods to a local-importer in dollars, payment to be made against delivery of documents. C.i.f. quotations are said to be common. The Argentine Republic is Japan's best customer, taking merchandise to the value of 6,107,025 yen in January-June this year, and 5,210,430 for the same period of 1918.

Abnormally high freight rates from the United States and Europe, as well as export restrictions in belligerent countries, have given the Japanese manufacturer an opportunity of which he has taken quick advantage. After a return to normal conditions distance will place him at a distinct disadvantage. That he intends, however, to remain in the market is apparent from the establishment of numerous branch houses, a bank, and a Chamber of Commerce at Buenos Aires.

Among the Japanese commodities which have found a market at Montevideo may be mentioned, in addition to the usual novelties, cotton piece-goods and drills, silks, shellac, rice, tea, tape, electrical supplies (particularly lamp cord), arsenic, and other drugs, heavy chemicals, medical compounds, druggists' supplies, steel rope, carbide, alarm clocks, toys, etc. Japanese steamers also bring sugar from Java, block tin from Singapore, tea and spices from Colombo, bagging from India, etc. A leading Montevideo importer recently received the visit of the Buenos Aires representative of a Japanese house and was offered a wide range of products, including, among others the following: Grated coconut, arsenic, stationery and office supplies, electrical materials, tooth brushes, chemicals, chlorate of potash, tea, etc.

One importer, who purchased Japanese specialities through German houses before the war, has during the past eight or ten months received without solicitation directly from Japan samples of muslins, poplins, cottons, towels, hosiery, underwear, silks, shoe leathers, electrical goods (chiefly lamp cord), pottery, toilet soaps, etc. The lines offered by Japanese merchants are constantly increasing in range and variety.

INDUSTRIAL ART AS A NATIONAL ASSET.

An American View.

Both in quantity and quality production, the value of a course of training in industrial art is destined to be an important factor in enhancing the value of finished goods. The subject is at present receiving special attention by a Department of the British Board of Trade in this country, and the Bureau of Education in the United States of America, say in a pamphlet recently issued that America must turn from her quantity methods, and, through industrial art training, put the country's commerce on a quality basis.

"There are not three standards of good taste," the pamphlet states "one for the producer, one for the storekeeper, and a third for the person who buys the goods. Yet these three groups have in modern times each misjudged the others, because education has yet to standardise and inter-relate their interests and tastes." In this concise statement, it is claimed, is indicated a basic problem confronting commerce to-day, and the pamphlet, which is summarised below, has been written to explain what training in industrial art can do to help to solve it.

WAGES AND EDUCATION.

While the activities of a nation depend upon its average ability, it is only through the training of the individual that the average can be changed. The comparison between the length of time the average hundred boys and girls remain in school and the incomes of the average American wage-earners offers valuable suggestions :—

Sixty-seven per cent leave school before completing the eighth grade.

Sixty-eight per cent of our citizens earn less than 15 dols. a week.

Thirty-three per cent of the students entering school complete the eighth grade.

Thirty-two per cent of the workers of the nation earn over 15 dols. a week.

From those thus remaining in school are recruited the more highly skilled workmen and practically the entire body of the professions, including the designers, upon whom the entire fabric of American manufactures depends. Higher standards of workmanship and higher wages depend upon the training given in the industrial arts to those who form the mass of workmen, and upon whose skill depends the carrying out of the designer's ideas. Ninety per cent of the people gain no technical education higher than the eighth grade. This means that 90 per cent of the workers between the ages of 16 and 23 have no technical training except that which they have "picked up" themselves.

DESIGN AS A TRADE FACTOR.

The prosperity of the nation, the city, and village, as well as of the individual, depends upon the "turn-over" of their products as sold in the stores not only of our own country, but in those of the entire world.

Next to competition upon the ground of price, which is the chief factor in the sale of goods, without other merit the competition for goods made attractive through superior design and durability shows the wisdom and need for our cities to take definite steps toward the establishment of industrial art schools.

These schools will in time increase the quantity and value of the manufactures of their cities and of the nation—

(1) By training the designers, workmen, and salesmen to sell superior products in the thousands of stores of their class.

(2) By training the buyers and users to discriminate between the ugly and the bizarre and be able to choose and demand goods of merit.

Although education in art and industry can prepare us to make and choose wisely, whether we profit by this instruction individually or collectively depends upon our own initiative: (1) as consumers demanding design and durability in exchange for a reasonable price; (2) as designers, firm in the standards we set, being guided by the principles of evolution rather than by the idiosyncrasies of fashion; (3) as workmen, taking pride in excellence of craftsmanship and feeling a share of responsibility for the output; (4) as salesmen, guiding the buyer through an intelligent and thorough understanding of the romance of goods and a sympathetic insight into the needs of the purchaser, resulting in an enlightened customer and a satisfactory sale.

Except the agencies of education in industrial art bring these different groups of people to have the same standards, there will always be an unbridged gap between them—resulting in the customer's inability to get the goods he desires, the designer's failure to follow any standard but the "fashion," and the manufacturers' inability to sell on any basis other than price.

FROM BULK TRADE TO QUALITY SALES.

The commercial supremacy of the United States was largely reared upon the bulk disposal of raw or

semi-finished materials. American natural resources, while vast, are not unlimited. In fact, according to the National Conservation Commission, "the known supply of high-grade iron ore in the United States approximates *4,788,000,000 tons, which at the* present increasing rate of consumption cannot be expected to last beyond the middle of the present century." This is an example of similar situations regarding other raw materials, particularly minerals.

We have been selling our resources on the bulk basis. It is said the United States sells 2,000 lb. of goods per 100 dols., England sells 1,000 lb. of goods per 100 dols., France sells 400 lb. per 100 dols., and Germany sold 30 lb. per 100 dols. Either we must turn from our quantity methods and, through industrial art training, put the nation's commerce on a quality basis, or we shall lose the opportunities and advantages which our fast-diminishing resources of raw materials offer.

There is no limit to the value that design and workmanship can add to the raw materials of the nation except that which is imposed by a lack of facilities for training the designers, workmen, salespeople, and consumers. The United States will not be able to increase the worth of its products toward the highest market values until it has more schools to train its people in the refinements of design and workmanship. The average extra dividend which skilled workmanship declares to a community is 59 per cent of the value of the finished product, the raw material being on an average worth 41 per cent of the selling price. Skill, therefore, adds to the wealth of a State on an average 144 per cent through a more efficient use of its raw materials.

EDUCATION.

Extension of Primary Education in Bengal.

In his opening speech before the Conference of Commissioners and Heads of Departments held at Darjeeling during the middle of this month Lord Ronaldshay referred to the question of Primary Education thus:

"There is one other item on your agenda paper *which is of such immense importance* that I cannot conclude these few remarks without making some reference to it. I refer to item number 18, which deals with the extension of primary education. In this connection you will have received the illuminating and suggestive note which has been drawn up by Mr. Dunn. We all realise, I am sure, the importance of primary education and the need for its wider diffusion, but I am disposed to think that the extent of the progress which has been made in Bengal is *not generally realised. The most recent statistics show that 1,200,000 boys, or approximately half the* boys of primary school age, are already receiving some sort of primary education. The cost involved is approximately Rs. 4,000,000 a year, of which about one-half is derived from fees and the other from revenue, imperial, provincial and local. But the whole structure of primary education suffers from the lack of system. Of the 34,000 primary schools the greater number have sprung up spontaneously, like the wild flowers of the forest. What we have to do is to play the part of gardener, to take *the forest in hand and convert it into a well-ordered* garden. The subject falls naturally into two categories—the urban and the rural. Mr. Dunn lays *stress upon the fact that in the municipalities,* apart from Calcutta, there is even less trace of the system than in the rural areas, and he urges the necessity of a system of primary school control being created. I hope that the Primary Education Act which became law last spring will prove of substanial assistance to us in this direction. The preliminary steps which are authorised by that measure have been taken and we await with interest the replies of the different municipalities to the references which have been addressed to them. Turning to the districts, we find *two methods of promoting primary education* adopted by the District Boards. The more usual method is that of giving grants-in-aid to schools as they spring up, a method altogether lacking in system, in that it takes no account of the geographical distribution of the schools. The second method, which *had its origin in Eastern Bengal, is far more* scientific, and consists in building and maintaining a definite number of schools distributed on a given plan throughout panchayati unions. Considerable progress has been made with this scheme. Some 5,350 of the *7,580* of the panchayati unions are already in possession of satisfactory schools, but only about one quarter of the primary schools in rural areas have come into existence under this system, and the remaining three-quarters have sprung up on no organized plan at all. It seems quite clear, therefore, that one of the first things to be done is to introduce a system where blind chance at present reigns. Hardly less *important than the introduction* of a system into any scheme of expansion is the provision of trained teachers to staff the schools. This is a matter which has been occupying the attention of Government for some time past and, as you will see from Mr. Dunn's note, the scheme which we have submitted to the Secretary of State provides for an annual output of 3,200 Gurus when *it is in full operation.* Even under this scheme it will be some years before the existing schools, apart from new schools which will come into existence, will be adequately staffed with trained teachers, and it is a matter for consideration whether in the circumstances of the presidency the scheme can be expanded and speeded up.

CORRESPONDENCE.

To

The Editor,

Mysore Economic Journal, Bangalore.

Women's Education in Mysore.

Sir,—The whole problem of Education in Mysore is in the melting pot and Government are endeavouring to evolve with the public co-operation a definite educational policy. Every body seems to take much interest in the education of boys and various means are proposed to bring about a salutary system, while the equally important side of the problem, *viz.*, the Education of Women, is relegated to a corner. Here and there we find an enthusiast, an ardent advocate of Women's Education. But even his warmth for the cause becomes cooled by the utter indifference of his seniors. That the problem requires immediate solution is undoubted. While additional facilities are ever and anon being created for the progress of the boys, women are—perhaps with a few exceptions—being driven down a retrogressive path. Home is not "sweet home" without the meeting of the parallel culture within its four walls. Imagine a house which the husband tries to keep tidy, while the wife besmears the ground with cow-dung, firmly believing that such an operation is a purifying ceremony. The culture of both the sexes should proceed *pari passu* for the sake of domestic happiness, the healthy training of children and, in short, for the general welfare of the family.

Granting then, the necessity for the education of women, the question arises as to the medium of instruction. An eminent member of Government has very forcibly advocated the cause of vernacular being made the medium of instruction for women. Opinion is unanimous in the educated circle that the gates of Western knowledge can be tapped and women made "to drink deep" from the fountain of Western culture by means of imparting instruction through the language of the country. The pity of it is that, though people have this opinion in their heart of hearts, they are not bold enough to come forward, lest they might be tabooed as "old fashioned." But the day has come when we shall have to assume bold attitude towards every problem requiring solution, and we need not hesitate in giving frank expression to honest thought. Many of our educationists—both retired and still in harness—have not enlightened the public with their ideas, and this letter has been written with a hope that they will open the flood gates of their thought and set forth definite ideas about the vexed question of a medium of instruction

The scheme proposed by the present Inspector-General of Education is sound to the very core. He has studied the problem from several standpoints and has come to the conclusion that vernacular should be the medium of instruction. There is perfect justification in his making a difference between the education of boys and girls. The one curriculum cannot be adopted *in toto* by the other. God, the Creator of both the sexes, distinctly meant that there should be a difference between them. While the male sex is better fitted to undergo the fatigue of labour in order to eke out a livelihood, the female sex is by nature intended for work of less strain. "Man to earn and woman to contribute to the domestic happiness" must be the motto for the solidarity of the dying Hindu Organization. The present materialistic world may adopt a different motto, *viz.*, "Man to earn and women to earn, combine the income and live happy". I do not suppose for one moment that a woman bent upon earning an income will ever care to look to the duties of a housewife. She will cease to be a "Phantom of delight" and, ere long, she may take rank with the notorious Dame Van Winkle.

Then it may be asked, should not women earn an income? No man with common sense will say nay to this question. By all means let them earn, only by pursuits which are quite in consonance with their dignity as "Ministering Angels." In the present social organization, ordinarily there is no necessity for women to earn exclusively. They are but partners in the piloting of the domestic-ship and they are expected to lend a helping hand to the Captain and not conduct it as they please. However, unusual circumstances may occur when a woman has to earn a living—I mean the unfortunate class of widows that exist in the Country—when very sympathetic treatment is required. Bereft of the protector in early age and cast adrift on the broad world to die or to live, there is a likelihood of their deterioration, if not properly guided. To these, perhaps, the medium of instruction may be English as they need to imbibe Western culture to a very great extent and to vie with men in every walk of life. What is sauce for the widows cannot be sauce for the wives. Let the former, in their need for English Education attend the schools and colleges meant for boys and compete with them in all the public examinations. Wives do not require the Hall Mark of any University. It is immaterial to them whether they master "Grimm's Law" or fail to understand the "Doctrine of the Encilisis." What they want is improvement in culture, which can be obtained by receiving instruction in vernacular. In this connection it must be admitted that the educated husbands have very great responsibilities on their shoulders. They have

access to Western culture must translate those ideas into vernacular for the betterment of their "better-halves." Text-books in vernacular required for a general proficiency course can be provided in a couple of years if they are not already in existence. The existing books should be made suitable for women and more should be written at once. A translation of Ganot's Physics is not necessary for women whose future lies in a cultured life in a happy home. A knowledge of Physics and Chemistry will go a long way to improve one's mind, but I do not know why research work, which can with advantage be left to men, should be undertaken by the "Hysterical women." Music, Painting and Cookery can be better taught in vernacular than in English. That the English notes jar on the Hindu ear is too well known and the playing of the Indian songs on the Harmonium cannot be described as very harmonious. The impression which prevails among women that men want to make a monopoly of culture is unfounded. Educated men would rejoice to have enlightened women their life partners. It is a fallacy to suppose that our salvation consists in nothing else except the wholesale importation of Western institutions. Our social and economic regeneration is quite unique. The West cannot wholly serve as a model for the East and the pitfalls into which the West has fallen in the past may be avoided. Thus, Western ideas can serve only as a guide and not as panacea.

The Reddy's School of opinion does not totally exclude English from the proposed curriculum. It may be studied either as a compulsory second language or as an optional subject. Vernacular is to be the medium of instruction to remove "the waste of energy and time, the encouragement of cramming and discouragement of all originality in thought." Government cannot legislate for a limited sect in a community. They must take the general state of affairs and in forming their schemes, allow exceptional circumstances, exceptional treatment. The argument that the reform of making vernacular the medium of instruction, should be first introduced into boys' schools and then into girls' schools, gives rise to an impression that men want to maintain the upper hand over women. It is far from the truth. The reform regarding the numerous boys who have advanced too far in English education cannot be brought into force by a *coup de etat*. It will take, perhaps, half a century to bring about that "consummation devoutly to be wished for." The number of women Graduates can be counted on one's fingers and the majority of girls have not got any kind of education. So, it is easier to start with vernacular as the medium of instruction.

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BOOKS IN BRIEF.*

Principles and Methods of Taxation.—*By G. Armitage-Smith. Published by John Murray, London. 5sh. net.*

Dr. Armitage—Smith's book needs no introduction at our hands. That a Seventh Edition of it has been called for shows its great popularity. Not only that it also testifies to the eminently practical manner in which a highly complex subject has been treated by Dr. Armitage-Smith. Its enunciation of the principles on which British taxation is based is both clear and concise. The present edition is enlarged and brought up-to-date with the addition of financial statements of war expenditure and the means of increasing the revenue during the war. In chapter two of the book the interested Indian student will find a brief but suggestive account of the Indian and French systems of revenue. We have scarcely any doubt that Dr. Armitage-Smith's book, in its present revised and enlarged form, will be widely appreciated by students and general readers.

War-Time Financial Problems.—*By Hartley Withers. Published by John Murray. Price 6sh. net.*

It is impossible to speak too highly of any book from the pen of Mr. Hartley Withers. It is not infrequently an intellectual treat to read one of his volumes. The present one dealing with war-time financial problems is not only, as usual, a thoroughly readable but also economically sound. Mr. Withers-writes in his inimitable way of Bank amalgamations, Currency questions, Company law reform, the Outlook for Capital, Treasury Control, the Capital Levy and many other allied subjects and offers suggestions which are not only original but also, we think, thoroughly feasible. Take, for instance, the taxation of capital. His criticism of the proposal is, we think, unanswerable on principle. His own contribution to the subject of debt redemption is a debt charge supertax which he elaborates in specific terms at pp. 224—225 of his book. His chapter on "Meeting the Way Bill" deserves careful study, especially at the present moment when most seem to forget that production—increased and constant production—is the key to the situation.

Papers on Current Finance.—*By H. S. Foxwell, M. A. Published by Messrs. Macmillan and Co., London. Price 10sh. net.*

This is mainly a reprint of papers and contributions made by Professor Foxwell of the London University to the *Economic Journal* and to other magazines and reviews. That Professor Foxwell's views expressed during the time the war lasted affected the policy of Government in regard to finance shows their

general soundness, both from the practical and from the theoretic points of view. Professor Foxwell advocated not only continuous borrowing but also heavy taxation. He also urged the interesting of the small investor. What Professor Foxwell says in regard to financing of industries ought to interest a wide circle of people in this country. His remarks on this topic are in fact of wider application. There are perhaps some who will not, however, wholly agree with him in his views on national finance *vs.* international finance and inflation. Professor Foxwell is a thorough going optimist—and his confession in this regard largely disarms criticism—and his opinions reflect his frame of mind. Incidentally we would note the praise—well deserved as we think—he bestows on the United States Federal Reserve Act. Those who realize what it has done for America during the war will know the utility of an organization of that kind specially during financial crises of the kind brought into existence by sudden outbreak of war, etc. Professor Foxwell in his introduction utters a word of protest against the secrecy that has prevailed in the British Statistical Department, during the war period. He says:—"This policy of secrecy and mystification is the most ugly feature of our war *regime*. It is to be hoped that it will end with the war. Publicity is the salt without which democracy (and we may add, bureaucracy) would soon become rotten; it is the indispensable condition of the healthy operation of public opinion."

The Indian Munitions Board have just issued a monograph entitled "The manufacture of Paint and Varnish in India" by Mr. N. Brodie, B.Sc., Chemist, Government Test House, Alipore. Copies may now be obtained from the Superintendent, Government Printing, India, 8, Hastings Street, Calcutta (Price four annas.) The following are the chief headings in the volume:—(1) Vehicle and varnish materials; (2) Pigments; (3) Manufacture of varnish; and (4) Manufacture of paint.

The Madras Government concur in the opinion of the Director of Public Instruction that the proposal to open a special secondary school for Panchamas is neither educationally sound nor at present practically feasible. They sanction the Director's proposal to institute sixteen scholarships and an equal number of fee-remissions for the benefit of Panchamas and other boys belonging to the aboriginal or criminal tribes studying in secondary schools. The value of these annual scholarships will be fixed at Rs. 3 per mensem when held in Forms I to III, and at Rs. 6 per mensem in Forms IV to VI. The scholarships may be held in conjunction with fee-remissions.

Glass manufacturers in Canada have been largely dependent in the past upon the United States for their supplies of glass sand and sodium carbonate. However, according to the United States Bureau of Mines Report, the new plant at Amherstburg, Ontario, Canada, at which sodium carbonate is to be made by the Solvay process, is expected to supply all of Canada's needs for soda ash. The capacity of this plant is reported to be about 120 tons per day. Some glass sand is being secured from Oneida, Ontario, but it is said to be of an inferior grade, and only suitable for the manufacture of the cheaper grades of glassware.

The power at presnt utilised at the Niagara Falls amounts, according to the *Engineer*, to 605,000 h.p., whilst schemes in process of development will absorb a further 420,000 h.p. It is estimated that a total of 2,500,000 h.p., equivalent to more than 16,000,000 tons of coal per annum, may be obtained without impairing the natural beauties of the Falls. The substances produced by the various electro-chemical companies cover a wide range, including abrasives, refractories, fertilisers, metals and alloys, inorganic compounds, and a variety of organic substances, such as chloroform, methyl, alcohol, and formaldehyde.

The *Technical Review* states that exhaustive experiments have been made on the utilization of Para rubber seeds for oil suitable for paints, varnishes, soaps, etc., and that the cake produced from the residue after the oil is extracted compares favourably with linseed and other oilcake as a food for stock. Rubber-seed oil has been sold at 250 dollars a ton at a time when linseed oil cost 300 dollars. In British Malaya alone no less than 633,000 acres were actually producing rubber last year, and the seeds, estimated at 300 lb. to the acre, are at present allowed to fall to the ground and rot.

In Cuba plans have been formulated for the establishment of an "Association de Hacendadosy Colonos," the work of which will be divided into nine departments, *viz.*, agriculture and industry, immigration, transportation, statistics, national and import taxes, arbitration, banking and warehousing, moral and material interests, and legal. Among the objects of the association are the passing of beneficial laws, the lowering of the cost of machinery, implements, and other supplies, freights and taxes, loaning money to manufacturers and cane-growers until their produce is sold, intervening in disputes between growers and manufacturers, fixing the cost of labour, etc. It is emphasised that Cuba, as the greatest sugar-producing country, should have the deciding voice in the control of the world's sugar market.

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